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An Address.[1]

By KONRAD HILLER, M.D.,
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I DESIRE, first of all, to express my appreciation of the honour conferred on me by the invitation to be President of the Section of Medicine of this Congress. It is indeed a distinction to be called upon to join that long and distinguished list of occupiers of this presidential chair, and I value it accordingly.

In searching for a subject to form the basis of this address I came upon an article in *The British Medical Journal* of December 19, 1936, entitled "Syphilis and its Treatment Today". In this article, amongst other statements, there appears the following:

> Today the person who contracts syphilis and is treated under optimum conditions can look forward to the disappearance of all early lesions within a week or two, and complete cure in less than two years.

Further:

> There is no doubt that in this country at any rate there has been a big decline of recent years in the incidence of syphilis and in deaths from congenital syphilis.

The thought then arose: Does this correspond with one's own experience? I suppose most of us who have practised for many years will give an unqualified assent to this question, and will recall to mind

[1] President's address, delivered before the Section of Medicine of the fifth session of the Australasian Medical Congress (British Medical Association), Adelaide, August, 1937.

the congress of 1908 at Melbourne, at which the late Sir Harry Allen stated that syphilis was much more prevalent in Victoria than was realized, and inferred that other States were probably similarly affected. He based his statement entirely on his pathological experience at the Melbourne Hospital. Amongst his more important points was the statement that "the great marks of syphilis are in the arterial walls and widespread fibrosis of organs is the result of that disease". He expressed the opinion that aortic aneurysm and aortic regurgitation were, in the great majority of cases, due to syphilis; that that disease was a potent cause of coronary atheroma and of mitral obstruction; that interstitial pneumonia, when not due to dust or tuberculosis, was usually caused by syphilis, and fibrosis of the pancreas frequently had a similar basis; that general paralysis of the insane and *tabes dorsalis* were being recognized to be syphilitic affections, whilst obscure affections of the nervous system had a similar origin.

The Section of Medicine at that meeting took up a conservative attitude, and on clinical grounds was not prepared to accept the whole of the pathological data on which the *post mortem* diagnosis of syphilis depended; but it fully realized that syphilis was a most terrible disease.

The congress of 1911, at Sydney, concerned itself very largely with the same subject, and that of 1914, at Auckland, devoted a plenary session to discussion on the report and recommendations of a committee which had been appointed to investigate the subject of syphilis.

Up to the time of the discovery of the *Spirochæta pallida* by Schaudinn in 1905 and its comparatively easy demonstration in certain stages of the disease, the diagnosis of infection was dependent on clinical grounds; but this, with the introduction in 1907 of the serum diagnosis of Wassermann, gave the medical world an entirely different and much more satisfactory criterion of the presence of the disease. Then followed the great advance in treatment which the Ehrlich-Hata arsenical preparations of "606" and "914" ensured, followed later by bismuth preparations.

It is not the object of this address to labour further the question whether the disease was as widespread at that time as it was alleged to have been, but rather to deal with the disease from two aspects, looking at it through the spectacles of experience of the last ten to fifteen years. In the first instance an attempt will be made to review, from a clinical point of view, those conditions which were declared, on pathological appearances, to be produced by syphilis, and in the second, to find whether evidence can be produced of the decrease of its incidence in Victoria and what is the effect of present-day treatment.

Pathological Considerations.

As regards the first, I am neither competent nor willing to discuss the finer points in pathology concerning whether certain macroscopic and microscopic appearances are undoubtedly syphilitic. It is for the pathologist to tell us this. It appears, however, that there is still no unanimity of opinion as to whether certain pathological conditions can be brought about by toxins other than syphilitic, and it was just on that point that the Section of Medicine took up a conservative attitude at the congress of 1908, already alluded to.

That the Wassermann test, fallible as it may be and not infrequently is, has aided enormously to shape our opinions, is undeniable, and it has done much to make our statistics as regards syphilis more reliable. It must be remembered that as far as statistics are concerned syphilis is practically only diagnosed when the Wassermann reaction is or has been positive; further, that, apart from the fallibility of the test, a reaction disappears as a result of treatment, so that we can say that when statistics have been dependent on positive Wassermann results, these figures will represent an understatement rather than an over-statement.

Post mortem evidence in this series was rarely necessary for the diagnosis of syphilis to be made. It practically always confirmed the presence of the disease when the results of a serum test had already indicated it. The statistics of the in-patient department of the Royal Melbourne Hospital have been largely drawn upon for material throughout this paper.

The first assertion made by Allen was that the great marks of syphilis were in the arterial walls; he stated that aneurysm of the aorta and aortic regurgitation were almost entirely of syphilitic origin. So far as aortic aneurysm is concerned, clinical experience does entirely support that opinion, and if we turn to the statistics of the Royal Melbourne Hospital we find that of 82 cases that occurred there between the years 1926 and 1936, 68 were syphilitic, that is, over 80%. (See Table I.)

TABLE I.

Aneurysm of the Aorta at the Royal Melbourne Hospital.

Year.	Number of Cases.	Number Syphilitic.
1926–1927	9	9
1927–1928	11	9
1928–1929	5	4
1929–1930	9	8
1930–1931	7	6
1931–1932	12	10
1932–1933	8	5
1933–1934	7	5
1934–1935	13	11
1935–1936	1	1
Total	82	68

This corresponds closely with the results of the American Cooperative Clinical Group, who found a reaction to the Wassermann test in 90% of their 73 cases of aortic aneurysm. So confident have we become that a Wassermann reaction will be obtained in this affection that unless the patient has been treated a failure to react would make a revision of the diagnosis desirable.

Aneurysms in other parts, such as aneurysm of the abdominal aorta and congenital cerebral

aneurysm, are rarely syphilitic, and in dissecting aneurysm of the aorta syphilis plays no part.

Concerning aortic regurgitation the same high incidence of syphilis as a cause is not found. It is true that a preponderating number is of this origin; but other affections may also produce such a condition of the aortic valves. Thus, at the Royal Melbourne Hospital in the ten years preceding 1936, 254 patients with aortic regurgitation were admitted, and of these 101, that is, only 40%, were syphilitic.

TABLE II.
Aortic Regurgitation at the Royal Melbourne Hospital.

Year.	Number of Cases.	Number Syphilitic.
1926–1927	25	9
1927–1928	19	6
1928–1929	27	9
1929–1930	26	9
1930–1931	27	12
1931–1932	30	8
1932–1933	23	11
1933–1934	23	10
1934–1935	26	17
1935–1936	28	10
Total	254	101

It is well recognized that syphilitic aortic regurgitation is the result of an invasion of the walls of the aorta by the syphilitic process and an extension of this aortitis to the aortic valves, which ultimately become so damaged or sclerosed as to allow regurgitation. Therefore, aortitis is always present in aortic regurgitation of luetic origin; but it may also be present without involvement of the valves.

At the Royal Melbourne Hospital aortitis has been diagnosed in 153 cases over the same period of time. Of these, 106, or 70%, were syphilitic.

TABLE III.
Aortitis at the Royal Melbourne Hospital.

Year.	Number of Cases.	Number Syphilitic.
1926–1927	23	16
1927–1928	15	10
1928–1929	27	17
1929–1930	13	13
1930–1931	11	8
1931–1932	10	6
1932–1933	11	7
1933–1934	14	8
1934–1935	10	9
1935–1936	14	12
Total	153	106

Syphilis as a producer of general arteriosclerosis is almost unknown. Dr. Wright-Smith, the pathologist of the Royal Melbourne Hospital, after an analysis of 4,000 consecutive autopsies in the past ten years, concludes that there is no causal relationship between syphilis and essential hypertension and atherosclerosis. Further, he concludes that syphilis is not a cause of true atheroma. True atheroma affects the intima of the arteries, whereas syphilis attacks the vessels from without, through the *vasa vasorum*, in which the basic lesion is a periarteritis, followed by endarteritis. In the syphilitic artery, be it atheromatous or not, the earliest change is seen in the adventitious coat, followed by changes in the medial coat, where there is tremendous destruction, necrosis and scarring, with vascularization, which may extend into the intima. So are the linear scars and puckering of the intima produced.

In contradistinction to Allen's opinion that syphilis is a potent cause of coronary occlusion, it is now well established that it is of rare occurrence. That it does occur is not questioned; but when it does it is rather from an extension of syphilitic aortitis to the mouth of the coronary artery than to an actual affection of the length of the vessel. Of 334 cases diagnosed as coronary occlusion in ten years following 1926, 16 were syphilitic, 259 atherosclerotic, and 59 due to other causes. Thus, about 5% were luetic and 75% due to atherosclerosis.

That in a very large proportion of cases mitral obstruction is attributable to syphilis has not been borne out by experience. I have seen most typical cases of this valvular affection in persons who were congenital syphilitics; but they also had rheumatic fever or some manifestation of it in early life, and it seemed that the syphilitic tendency to fibrotic changes had appeared in a valve involved in a rheumatic affection. It is true that mitral stenosis does occur not infrequently at the same time as involvement of the aortic valve in a luetic process and, therefore, it is reasonable to believe that it may occur alone from this cause. Of 513 cases of mitral stenosis at the Royal Melbourne Hospital during the years 1922-1936, six only were deemed to be due to syphilis and four of these were associated with aortic regurgitation. One patient was a congenital syphilitic, leaving only one in whom the stenotic process appeared to be due to acquired syphilis.

Chronic myocarditis of syphilitic origin occurs, but is not common. T. P. Magill, in the *Bulletin of the Johns Hopkins Hospital*, 1935, refers to 20 cases of this condition which he had studied, and speaks of it as a rare affection. It occurs fairly frequently in association with aortic diseases of luetic origin, but rarely as a separate entity.

Chronic pancreatitis on a syphilitic basis is not common. Only one case was found in the Royal Melbourne Hospital records of the last ten years. Fibrosis of the lung of luetic origin is much more frequent. In the last twelve years 117 cases of syphilitic fibrosis of the lung were recorded at the Royal Melbourne Hospital. It may be that chronic lung affections are more frequently syphilitic than these figures suggest.

Turning to affections of the nervous system, general paralysis of the insane is undoubtedly in all cases due to syphilis, and it may be accepted that the diagnosis of this affection is not complete in the absence of a positive reaction by the serum or cerebrospinal fluid to the Wassermann test. In *tabes dorsalis*, although it is generally recognized as syphilitic in origin, the positive Wassermann results are not so

high. The group now called cerebro-spinal syphilis is probably what Allen had in mind when he referred to a very large proportion of the more obscure affections of the nervous system, in which parasyphilis was one important factor. This, of course, is well recognized now and does occur with moderate frequency.

TABLE IV.
Cerebro-spinal Syphilis at the Royal Melbourne Hospital.

Year.	Number of Cases.
1926–1927	23
1927–1928	18
1928–1929	40
1929–1930	16
1930–1931	21
1931–1932	26
1932–1933	24
1933–1934	10
1934–1935	10
1935–1936	8
Total	196

The Incidence of Syphilis in Victoria.

I come now to the second consideration, namely, whether evidence can be produced of the decrease of incidence of the disease in Victoria, and what is the effect of the present-day treatment.

Since the declaration of syphilis as a notifiable disease in Victoria, on July 1, 1917, numerous clinics for the treatment of venereal diseases have been opened. Free treatment is now provided for all. Country medical practitioners can, on application, obtain "606" or "914", or their equivalents, free, for any poor patients, on condition that they are prepared to give free treatment. Were notification thoroughly carried out it would be easy to assess the prevalence of the disease; but it must be confessed that this is almost certainly not done; in fact, my investigations clearly show that. So that, although there is a pronounced diminution in the number of notifications, from 2,411 in 1917-1918 to 376 in 1935-1936, and notifications of congenital syphilis from 243 to 3 in the same period, this must be regarded as misleading, quite apart from the fact that the earlier figures would represent not only new infections, but large numbers of old infections, presumably, for which treatment had been given for a longer or shorter period. Further, no distinction is made in notification between new and old infections, the case being reported only as one of syphilis, though congenital syphilis is always reported separately.

This channel of investigation being, therefore, closed, an attempt was made to obtain the information from other sources. I am indebted to Dr. C. H. Johnston, who controls the venereal diseases clinics outside of the public hospitals, and particularly the male clinic in Little Lonsdale Street, Melbourne, for the information supplied. This clinic is estimated by him to deal with two-thirds of the freshly infected patients in the metropolis; his figures are as shown in Table V.

It is, of course, the practice of the clinic to declare a patient syphilitic only after the demonstration of the spirochæte in a smear or by the presence of a Wassermann reaction, so that the results can be regarded as reliable and representing the numbers of newly infected persons who presented themselves at the clinic in each period.

TABLE V.
Fresh Infections of Syphilis over the Period 1918–1936 at the Male Venereal Diseases Clinic, Little Lonsdale Street, Melbourne.

Year.	Primary Syphilis.	Secondary Syphilis.	Totals.
1918–1919	262	136	398
1919–1920	598	176	774
1920–1921	253	82	335
1921–1922	258	56	314
1922–1923	224	37	261
1923–1924	222	45	267
1924–1925	179	33	212
1925–1926	115	27	142
1926–1927	196	29	225
1927–1928	234	35	269
1928–1929	196	42	238
1929–1930	97	10	107
1930–1931	108	18	126
1931–1932	117	15	132
1932–1933	94	23	117
1933–1934	63	9	72
1934–1935	81	22	103
1935–1936	76	6	82

An attempt was then made to obtain figures concerning the prevalence of tertiary manifestations, and for this purpose, in the first place, statistics obtained from Dr. Ernest Jones, late Director of the Department of Mental Hygiene of Victoria, were used; these are shown in Table VI.

TABLE VI.
Numbers of Patients Suffering from General Paralysis of the Insane Admitted to the State Mental Hospitals, Victoria, during the years 1905 to 1936.

Year.	Males.	Females.	Total.
1905	—	—	16
1906	—	—	24
1907	—	—	42
1908	48	5	53
1909[1]	42	2	44
1910	57	11	68
1911	67	2	69
1912	65	11	76
1913[2]	75	13	88
1914	66	17	83
1915	60	8	68
1916	55	2	57
1917	51	5	56
1918	36	8	44
1919	41	5	46
1920	47	7	54
1921	38	—	38
1922	37	3	40
1923	35	1	36
1924	35	6	41
1925	35	3	38
1926	34	2	36
1927	34	2	36
1928	35	5	40
1929	21	1	22
1930	26	6	32
1931	24	5	29
1932	23	3	26
1933	29	11	40
1934	19	13	32
1935	40	8	48
1936	30	6	36

[1] Wassermann tests started in Victoria.
[2] Treatment by "Salvarsan" becoming fairly general.

They show the admission to the State mental hospitals of patients with general paralysis of the insane, from 1905 to 1936. It has to be remembered that in these times no case is diagnosed as general paralysis of the insane without a reaction to the Wassermann test, so that these results also may be regarded as reliable, at any rate from the time

that the Wassermann test was introduced. Further, it has been pointed out to me that since malarial treatment was introduced in 1926 persons suffering from this affection have been admitted to the State hospitals as voluntary boarders for the purpose of this treatment only, and that the department takes no note of these. Thus in 1936 there were ten male and seven female voluntary boarders admitted, making, with the 36 certified patients, a total of 53 patients suffering from general paralysis of the insane in that year.

These figures are rather disturbing, for, allowing for the fact that some of these patients may have been infected prior to the days of "Salvarsan" and similar drugs, there should be by this time some obvious falling off in the numbers of those treated by such drugs, provided treatment had been sufficient.

The incidence of aneurysm was taken from the records at the Royal Melbourne Hospital, and has been given above (Table I). Whilst there appears to be some falling off in numbers recently, other statistics, which will be shown at a later stage, do not indicate a similar position. Neither do the records of syphilitic aortitis nor those of aortic regurgitation of luetic origin, taken over the same period, show any diminution in numbers. If the whole of the syphilitic affections of the thoracic aorta be grouped together for the period 1926-1936, there is very little variation in the number of patients found to be affected from year to year. (See Table VII.)

TABLE VII.

Syphilitic Disease of the Aorta at the Royal Melbourne Hospital.

Year.	Number of Cases.
1926–1927	34
1927–1928	25
1928–1929	30
1929–1930	30
1930–1931	26
1931–1932	24
1932–1933	23
1933–1934	23
1934–1935	37
1935–1936	23
Total	275

Still another attempt to arrive at an estimate of incidence of the disease in hospital practice was to collect all those cases which, by cross-indexing, had been placed under the heading of tertiary syphilis. (See Table VIII.) The same question was approached from another angle. The records of the pathological Department of the Royal Melbourne Hospital were searched for the numbers of positive Wassermann reactions in each year. It was found that the whole of the records, up to August, 1928, were useless, because they took no account of the reexaminations that were made. Thus one person might have two or three specimens of blood taken at intervals during the year to test the results of the treatment, and the numbers of reactions would be swelled enormously. Since August, 1928, however, a card has been kept for each in-patient and out-patient, and the results of reexamination entered on it, so that the number of new reactions during each year could be ascertained. For these results I am indebted to Dr. Hilda Gardner. They show that there has been a tendency to falling off of numbers in recent years. (See Table IX.)

TABLE VIII.

Tertiary Syphilis at the Royal Melbourne Hospital.

Year.	Number of Cases.
1926–1927	56
1927–1928	39
1928–1929	69
1929–1930	44
1930–1931	69
1931–1932	77
1932–1933	68
1933–1934	67
1934–1935	70
1935–1936	81
Total	640

TABLE IX.

The Numbers of Reactions to the Wassermann Test at the Royal Melbourne Hospital.

Year.	Number of Reactions.
1928	198 from August.
1929	262
1930	206
1931	197
1932	147
1933	205
1934	141
1935	112
1936	117

Dr. Robert Southby, of the Children's Hospital, Melbourne, has supplied me with a record of cases of congenital syphilis. These cases are notified only when the evidence of syphilis has been clinched by a Wassermann reaction. They are thus to be regarded as genuine cases. (See Table X.)

TABLE X.

Number of Cases of Syphilis Notified by the Children's Hospital, Melbourne, since Enforcement of the Venereal Diseases Act in 1918.

Year.	Number of Cases.
1918	274
1919	64
1920	65
1921	65
1922	72
1923	51
1924	59
1925	39
1926	33
1927	24
1928	49
1929	46
1930	44
1931	10
1932	16
1933	11
1934	25
1935	16
1936	13

It has to be remembered that the discovery of syphilis in women attending antenatal clinics may be another factor in the lessening numbers of recent

years. It is well known that thorough treatment of the mother, especially in the early stages, but also throughout pregnancy, is responsible for the birth of many a healthy child which otherwise would almost certainly have been syphilitic.

Lastly, the aid of the Government Statistician for Victoria was sought. He provided the information concerning the number of deaths from aneurysm of the aorta, general paralysis of the insane and congenital syphilis during the period 1922-1936, shown in Table XI. This shows that there is a steady fall in the mortality of congenital syphilis. The same, but to a lesser extent, may be said of deaths from general paralysis of the insane, though it has to be borne in mind that malarial treatment may have been responsible, in some degree, for the lower mortality in recent years; but the deaths from aneurysm of the aorta show no falling away.

TABLE XI.

Deaths in Victoria from Aneurysm of the Aorta, General Paralysis of the Insane, and Congenital Syphilis in the years 1922 to 1936, inclusive.

Year.	Aneurysm of the Aorta.	General Paralysis of the Insane.	Congenital Syphilis.
1922	23	23	18
1923	21	31	22
1924	35	42	17
1925	34	32	13
1926	27	36	9
1927	26	31	14
1928	29	14	19
1929	54	12	10
1930	51	6	14
1931	25	24	5
1932	38	17	9
1933	22	33	12
1934	43	19	8
1935	35	22	10
1936	38	26	7

I quite realize that the evidence I have brought before you is by no means complete, that it is obtained from hospitals only. I have attempted, however, to collect evidence from different sources and from various angles, and feel that from it some conclusions may justifiably be drawn.

Dealing first with the incidence of the infection, it appears certain that the annual number of new infections, in Melbourne at least, is gradually and steadily dwindling.

When we examine results in the later stages of the disease, however, the picture is not so comforting. The statistics submitted to you, with the exception of those of the congenital syphilitics at the Children's Hospital, of those of cerebro-spinal syphilis, and of the number of positive Wassermann reactions at the Royal Melbourne Hospital in the last eight years, show no definite evidence of diminution of affections that we recognize as of syphilitic origin. It is true that most of these deal with the last ten years only; but records before that time at the Royal Melbourne Hospital are difficult to obtain and are often unreliable. How, then, can we explain that in the later stages of the disease there is not the diminution in numbers that we found in the early stages?

Granted that a proportion of these may have had their original infection fifteen or more years ago, or even before the use of the arsenical preparations, still one would expect the fact of the diminishing number of infections to show in some definite diminution in the later manifestations of the disease.

The Inadequacy of Treatment.

There arises the strong suspicion and even certainty that treatment in the early stages has not been adequate, and what appear to have been cures have, in fact, not been so. This is the conclusion that is being arrived at throughout the world.

The question, then, has become, what is adequate treatment? A very large amount of work has been done and much information obtained. The Health Organization of the League of Nations, in March, 1935, published the results of an inquiry into syphilitic treatment carried out in five countries: Denmark, France, Germany, Great Britain and the United States of America. Ninety-three clinics in these countries contributed to the inquiry, and 13,198 case records of primary and secondary syphilis were analysed. Guided by the principles revealed by the study of these records, certain recommendations were adopted. Amongst the more important of these were the following:

1. The principles to be followed in carrying out the actual treatment should be as follows:
   - (*a*) To employ a comparatively heavy dosage of arsenobenzene and of the bismuth or mercurial compounds, the doses being administered in comparatively rapid succession, especially at the commencement.
   - (*b*) To maintain a persistent attack on the disease, avoiding intervals of such length as to afford the parasite an opportunity of recovering.
   - (*c*) To administer approximately as much treatment to a person with primary as to one with secondary manifestations.
2. The period of observation, clinical and serological, after the completion of treatment, should be adequate and in any case not less than three years.
3. Adequate examination of the spinal fluid at least before dismissal from observation is essential.

It is now generally recognized that treatment should be over a period of between 12 and 18 months, or even two years. Whether treatment should be intermittent with courses of injection following in rapid succession, separated by rest intervals of some weeks, or continuous, or whether both arsenical and bismuth or mercury compounds should be simultaneously employed, or the two latter withheld until a number of arsenical preparations have been administered, is still a matter of opinion; but there appears to be a definite swing in favour of continuous treatment.

Conclusions.

The conclusions that are arrived at are as follows:

1. That fresh infections of syphilis are steadily diminishing in Victoria and that congenital syphilis is also becoming less frequent.
2. That, as far as this survey goes, evidence exists that treatment in the early stages has been inadequate.

If in the years to come this address can be used as a stepping stone in a further survey of this disease, it will have served its purpose.

Acknowledgements.

In conclusion, I wish to acknowledge my indebtedness to all those who have so willingly helped me in obtaining the information which I have submitted to you.

TUBERCULOSIS AND MARRIAGE.[1]

By J. GORDON HISLOP,
Perth.

THE problem of marriage and tuberculosis is one that must come with frequency to every one who interests himself in the care of the tuberculous patient. The problem itself can be divided into several phases, and to make my views more intelligible, because it seems that the phases and difficulties overlap so frequently, this paper has been given three main subdivisions: (i) Should the tuberculous marry, and, if so, in what circumstances? (ii) When tuberculous subjects have married, should pregnancy be allowed? (iii) If pregnancy should be terminated, what method do I as a physician favour?

I realize quite well that Young has laid down a dictum that most of us have attempted to follow. Here it is:

If a virgin, no marriage; if married, no pregnancy; if pregnant, no confinement; for the mother, no suckling.

This, however, is so stern and inflexible that most of us have had at times to modify our views. Recent forms of treatment, having brought about greater hopes of arrested diseases, have called for modern thought on the question of marriage.

Should Tuberculous Subjects Marry?

Returning to our first subdivision: Should the tuberculous marry, and, if so, in what circumstances? There are so many questions that I ask myself under this heading and I find so little satisfaction in reply, that I would cheerfully acquiesce in spending my time cataloguing a list of queries to which I desire an answer. Realizing, however, that you may be, and possibly are, in a similar position, if you will bear with me, I will put the question and then answer it, trusting it will provoke you to criticism.

Recently it fell to my lot to have to give up a pneumothorax after some months because of complications. However, as you have all experienced, arrest of the disease occurred, but the balance was so finely adjusted that I trembled lest the resistance break down and the infection once more assume control. During this stage the patient, a young girl of twenty-three years, asked my consent to her marriage. This I refused, strongly advising a longer period of convalescence, whereupon I was advised that it was taking place within a few weeks. When I asked if she had acquainted her intended husband with the state of her health, she replied in the negative, and added: "I forbid you to tell him should he inquire." My legal adviser counselled silence lest I incur heavy damages.

Thus, were I to ask the question, "Can I stop marriage?" I should have to answer: "No." Fortunately I was not questioned and, therefore, can only surmise what might have happened. Since marriage that girl has again asked for the protection of professional secrecy.

I propose from now on to take various cases, each exemplifying a stage of disease or circumstance, and ask the question: Should marriage be allowed?

The Problem in Very Early Disease.

The first patient was a young girl, aged twenty-two years, who became affected with pleural effusion whilst engaged to be married. Her mother at much the same age had had a pleural effusion, from which she had recovered; she had later suffered no ill-effects. The method of treatment of this effusion, which may have been regarded as tuberculous on the cytological report of the fluid, was by means of gas replacement, and gold therapy and rest as adjuvants. I allowed marriage at the end of twelve months of pneumothorax maintenance, on the grounds that if this girl had remained at home without working or earning her living, she might have been denied the necessary things that would tend to resistance building, whereas her husband was in a position to allow her every chance. An added rider here was two years' contraception.

Was I justified? I think so. But would I have been justified if circumstances had been different or reversed and marriage had meant physical work and anxiety? I think not. A further twelve months might have been suggested for stabilization.

The second patient was a young girl, aged twenty years, upon whom I had induced pneumothorax, which had been proceeding quite satisfactorily for a period of six months, when the request for permission to marry was made to me. I advised a further six months of successful pneumothorax therapy, upon which I gave consent.

My question then is: At what stage of an artificial pneumothorax may marriage be allowed? I answer: When the collapse has been satisfactorily maintained for twelve months; for in my experience complications of artificial pneumothorax therapy are much less common in the second year following the establishment and maintenance of adequate collapse.

The Problem when the Disease is Arrested.

Progressing up the scale of intensity of infection, I come to the patient with a small area of arrested parenchymal infiltration in the apex of one lung or of each lung.

You will note that so far I have referred only to the female sex; but in the instances quoted I would have given much the same advice had the inquiry come from a male patient, save that the question of contraception would not be of such importance. Here, however, we have reached a stage when one has to consider the advice given according to the sex of the patient. The ability of the male tuberculous subject to marry is

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

dependent very largely on his financial status; I still refer to those grades which we have discussed.

Now in this group the male appears to have more to gain from marriage than a female in a similar grade. The man has probably been living in lodgings, or at the best in a boarding-house if away from his home, and the acquisition of his own establishment brings ease and nursing to which he may have been unaccustomed.

In the case of the female, no matter what her previous life has been, in the average case marriage will bring extra responsibilities unless with a wealthy man who is prepared to give her every nursing requirement until her health is regained and she assumes the rôle of housewife. It seems that a dogmatic answer cannot be given to this question, but that each case must be dealt with on its merits. The main factors that appear to influence my decision for the female are, first, the length of time that arrest has been known, and, secondly, the responsibilities and duties that the marriage under discussion will bring to her.

The Problem when the Disease is Active, but not Extensive.

Then further on: activity is present, but the infiltration is not gross. Here again I would include both sexes, and once more state that financial circumstances might allow a marriage that one would in other circumstances view unfavourably. My views here are against marriage. If, at this stage, I refuse consent, when will I give it? I answer you: When clinical and radiological tests have shown freedom from activity for two years. There are, however, occasions on which I have amended this time to one year. To a large extent I am swayed by the intelligence of the couple and their ability to see the reason of advice given them and to carry out that advice.

If this be my view of marriage, can I conceive of any circumstances in which marriage might be advised to a patient with an open lesion? To be consistent one must answer, "no"; but one can conceive of circumstances that would make marriage of benefit to the patient. But what think you of the other person concerned in the partnership? Is marital tuberculosis so uncommon as to make it possible to disregard the risk of infection to him or her? This is a very important point to pass over in a hurry, or on which to be dogmatic. I trust that some of you will have had some experience of marital tuberculosis and so be able to assist me; for my own experience has been a depressing one, so depressing as to lead me to the opinion that the rate of infection among husbands and wives has been greater than in those less dangerously placed in life. I have tried to recall a single instance in which marriage altered the rate of progress or assisted treatment in a male with an open lesion. I cannot be sure of one, though there are two in my mind in which, if I were called upon to be dogmatic concerning them, I might say that marriage had had some effect. Against this I have to balance always that marriage very frequently calls for treatment in the home, to me a most unsatisfactory method as opposed to treatment in an institution. At home there is always the tendency for the patient to over-exert himself as soon as well-being returns. It is probably this factor that narrows my viewpoint; others hold the opposite view.

I can recall cases in which marriage was beneficial to the female with an open lesion; but even they are few, and are the result of affluence and what affluence can bring.

The Problem when the Disease is Advanced.

And now we progress further to that case in which the prognosis is bad and almost hopeless, no matter what the treatment may be. Surely patients of either sex in such a condition should not be allowed to marry. The average length of life in such cases, even under modern treatment, is not much more than four years. Was it not McNalty, of London, who found that "75% of all cases with a positive sputum are dead within four years of the discovery of the bacillus"? Modern methods do not appear to have reduced this figure below 50%. In my experience, if the man in this condition marries, he leaves a wife within a few years, with one or two children to bring up. Are not these children potential sufferers later in life? If a woman marries, a man is left to mourn her fate, broken perhaps financially, and possibly with a child to educate. Before you advocate marriage to a man with an open lesion, I would advise you all to read the Commonwealth statistics showing ages at death. The average age at onset of tuberculosis is thirty-three years, and the age at death from cancer is over sixty years. Cancer is called our economic waste; but what of tuberculosis? If you again consult the statistics you will find that the average man of thirty-three years has children, the eldest of which is seven or eight years. At sixty years of age a man's family is grown up and self-supporting. Need I labour this point any further? I have said enough to make you realize that if you advocate marriage to a man with an open lesion, you must expect him to die at thirty-three years of age, leaving a wife and two children, almost inevitably totally financially embarrassed and unprovided for. Is it fair? And thus the answer to my question, "should the tuberculous patient marry?" must be "no", except when the possibilities of arrest of the disease are considerable.

Should Pregnancy be Allowed?

Should pregnancy be allowed? You will recall the part of Young's dictum applicable here: "If married, no pregnancy." You will recall also that Hippocrates held the view that motherhood was the treatment of tuberculosis. I have never understood how one so learned could hold a view so little in accord with our experience. So firmly have I held to Young's advice that I have almost overlooked the three cases I have on record in which pregnancy was successfully negotiated after or during the

maintenance of artificial pneumothorax. I am tending to the opinion that pregnancy is not a real cause for anxiety in the second year of a well-controlled pneumothorax; but I do advise that pregnancy should not occur until two years after the completion of the pneumothorax treatment. I have had the experience that the period of reexpansion is a difficult one, and advise the attainment of full reexpansion without any lighting up of the infection before pregnancy commences.

In the active stage I am definitely opposed to pregnancy, having seen, as you all must have, many examples of rapid spread of the tuberculous infiltration. I have seen pregnancy go to full term in a woman with an open lesion, apparently without much increase in the lung tissue involved. But in my experience payment is inevitable.

At the present moment I have a young woman under treatment who knew she had tubercle bacilli in the sputum seven years ago. She has two children, one aged four years and the younger two years. Pregnancy, except for the morning sickness, brought about a feeling of well-being; but this disappeared after a few months. Her sputum has been copious for over a year, and her lungs look radiologically to be beyond repair.

To digress for a moment. In such a case as this, when pregnancy does little harm and a sense of well-being ensues, avoidance of all suckling may lessen or avert the consequences of the pregnancy—again Young's dictum.

My own experience is that every woman with an active lesion should be advised to have an abortion, and should be given the reasons for the advice. Some of you may hold the view that one reason for this advice is that tuberculous subjects should not have children, on the grounds that such children start life with a lowered resistance and are potential spreaders of infection. This has much to commend it, as we all know of families wiped out with tuberculosis, all born with a lack of resistance, families that for many years have been a source of infection to all those in contact with them. But can we any longer use this as one of our reasons? Compare these views with what is happening in Russia, where the work is of great interest. Should a woman attending a tuberculous clinic become pregnant, she is placed under special supervision. If the disease is arrested, she is allowed to come to full term. If the lesion is acute, she is offered an abortion or sent to a particular sanatorium for the remainder of her pregnancy. Immediately the child is born it is separated from its mother for ten days, whilst it is immunized by the oral administration of *Bacille Calmette-Guérin* vaccine. Meanwhile, lactation is established by artificial means, and at the end of ten days the infant is returned to its mother; both remain for a further period at the sanatorium. In Moscow the authorities have faith in this immunization and hope eventually to bring the incidence rate of tuberculosis to a minimum. You will note also that they allow lactation, in opposition to Young's dictum; but alongside this you must realize that no difficulty in lactation is experienced among Russian women, artificial means being unheard of except in special circumstances such as these. Thus it would appear that, in the future, pregnancy will be inadvisable purely in relation to the health of the mother, and no factor relating to the child can be considered. In fact, in cases with a well controlled artificial pneumothorax, or in cases in which a pneumothorax may be induced and maintained, there will be no contraindication to pregnancy. At present, however, until the value of *Bacille Calmette-Guérin* vaccine is known, or at least until we are using it in Australia on a wide scale, it would appear that Young's dictum still holds good except in a few cases.

The Method of Termination of Pregnancy.

If pregnancy is to be terminated, what method do I as a physician favour? The method of termination again depends on the stage of pregnancy and the degree of pulmonary involvement. My own view is that every pregnant woman suffering from active pulmonary tuberculosis should be offered an abortion. If, however, the degree of involvement is such that a satisfactory artificial pneumothorax is possible, then I do not think that abortion should be stressed. Should, however, the patient accept the offer of an abortion, then again the method of performance depends on the stage of pregnancy. Should pregnancy be a mere matter of weeks, I should recommend a simple curette; but if the duration of the pregnancy be over two months, then I should advise against the abortion and induce pneumothorax, allowing the pregnancy to go to full term.

My attitude is explained in this way. If the patient is suitable for artificial pneumothorax therapy, then there is going to be a safer time for pregnancy; but if the termination of the pregnancy is only possible by an involved procedure necessitating an anæsthetic for cervical dilatation, then waiting for the resultant miscarriage and later a second anæsthetic for curettage, induction of pneumothorax and continuation of the pregnancy appear to me to carry less risk to the woman. When the pregnancy is early and the tuberculous condition unsuitable for pneumothorax therapy, I advise curettage; but if the pregnancy is between two and three months old before I am advised of it, then my advice may be very different. On more than one occasion I have seen how difficult it is to empty a uterus at this stage, and how much shock the patient may sustain. At the same time, I have realized that to carry out the orthodox sequence of dilatation, miscarriage and curettage is equally as much shock and in practice more expensive. Thus of late I have been tempted to ask the gynæcologist to perform subtotal hysterectomy of the gravid uterus. I have seen this done four times in the last year, three of the four patients being tuberculous subjects and one a diabetic with increasing albuminuria. I have been impressed with the absence of shock and the rapid recovery of the patient from this surgical

adventure. I am sure that my gynæcological colleagues have been equally impressed. Here again certain difficulties enter for discussion. Are there contraindications to subtotal hysterectomy? I think there are. First, the patient should be impressed with the fact that further pregnancies will be impossible. Never allow this fact to become a post-operative realization only. Having once pointed out definitely to the patient and husband the advantages and disadvantages, being assured that they both understand and appreciate thoroughly, allow the final decision to rest with them. If one child or more have been born, then the question of sterility does not seem to be of the same importance. Should the woman refuse to have a subtotal hysterectomy, I accept her view unquestionably and never refer to the subject again. I do not think that hysterectomy should ever be advised if there is any chance that recovery will occur to the extent that pregnancy could be undergone without risk. This, of course, must be considered by the physician, who, when once determined upon the correct course of action, must be dogmatic in his advice until his patient has given her considered views. Some of you may say that hysterectomy brings with it as a post-operative complication the possibility of endocrine and mental change. Possibly so; but I might answer that simple curettage may also bring post-operative mental disturbances. I think we should realize that we are dealing with this subject as a therapeutic measure in the management of pulmonary tuberculosis. The discussion of the after-effects of hysterectomy and curettage would help just as little as to discuss the religious ethics of these procedures. I do, however, feel that the religious views of our patients are something that we must respect and never interfere with.

Into this question comes the choice of anæsthesia. For curettage in a patient undergoing artificial pneumothorax therapy, two forms of anæsthesia are open: one "Cyclopropane" general anæsthesia, and the other spinal analgesia. In my four cases of subtotal hysterectomy the operation was performed under spinal analgesia. I may change my views later on; but at the moment I am recommending it as the more suitable.

And now, in conclusion, may I just voice a thought that is on my mind?

I was faced some little time ago with a difficult position when confronted by a patient with very advanced pulmonary tuberculosis who was three months pregnant. She could have withstood subtotal hysterectomy; but I was asked to be straightforward in my advice. The patient knew she had tuberculosis and put this question to me: "By what length of time will you increase my life by doing this hysterectomy?"

The thought in my mind is this: if you are faced with a patient whose expectancy of life is eighteen months only, are you justified in terminating the pregnancy? I am inclined to think not, unless, as I have pointed out before, the child is a potential tuberculous patient and may be infected by the mother in her last few months of life. We must be humane and realize that in this particular instance we would be submitting to pain and suffering a woman for whom that pain and suffering would do nothing either curative or palliative. I do not consider this justified. And, as a last word, yet me say that whilst we must regard this as a scientific subject, let us not forget the human aspect.

MARRIAGE AND TUBERCULOSIS: THE PUBLIC HEALTH ASPECT.[1]

By F. S. HONE,
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To the public health administrator and to medical practitioners with stereotyped ideas on public health, this paper advertised as written from the public health point of view, may seem too individualistic in its attitude. Partly this is the proof of the way in which the paths of public health and general medicine are converging. Partly also it arises from the fact that the paper was originally written after discussion with the secretary of the Section of Obstetrics and Gynæcology, with the idea in the forefront of getting general practitioners and specialists to share in the employment of preventive measures. Although it was later announced that the paper would be read before a meeting of the Section of Public Health, Preventive Medicine and Tropical Hygiene, I have purposely kept it much in its original form for the following reasons.

However successful impersonal and general administration may be in other departments of the campaign against tuberculosis, when we come to deal with the marriage problems of the tuberculous we have to deal with practical problems affecting two individuals and their relatives and dependants. Until we reach that Elysium dreamed of by health reformers where the community has become a eugenic stud farm. The marriage and subsequent married life of the tuberculous, as of the non-tuberculous, will rest with two individuals, who may be guided in their actions, but not compelled by law. It would be easy for me to write about standards of living and ideal legislation; but this morning we are discussing in a calm academic atmosphere the struggles, conflicting ambitions and passions of ordinary people.

We can pass legislation regarding the necessity for production of health certificates before marriage; but how far does that get us? We can also save ourselves from personal responsibility by giving advice to those about to marry: "Don't!" But that does not help solve the problems. In no part of the campaign is the necessity greater for that slow educative struggle that we all talk about, but hate to practise.

The person coming most into intimate contact with these individuals and their practical problems

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

will be the medical practitioner, whether he works under our present system or a system of national control; whether he is an officer of a clinic or friendly society or in private practice. The most successful campaign will be that waged under the closest cooperation between such general practitioners and administrative officers. For this reason I have retained the first person plural in much of this paper. For in this matter we are all united concerning legislation, and economic reforms can come only as our knowledge increases by personal participation in the campaign.

While I am convinced that some form of clinic or dispensary must be the central point of any national campaign, I have always agreed with Dr. M. J. Holmes in his repeated contention that these clinics should not work to take patients out of the hands of medical practitioners, but should make available more and more abundant facilities for aiding the personal supervision of the lives of patients and contacts by individual medical practitioners. This is especially true in our States, with their widely scattered country centres, and such a supervision is particularly important in regard to the problems of married tuberculous people.

In view of the frequency with which members of the medical profession are confronted with some aspect or another of tuberculosis in relation to marriage, it is somewhat surprising to find how few and scanty are the deliberate discussions on this subject in the literature that is easy of access. Most of the papers and discussions are limited to the question of marital infection, yet that is only one aspect of the subject.

At the present time the prevailing idea as to the mode of spread of pulmonary tuberculosis (which is the main question with which we are concerned in this discussion) is that in Australia at any rate the bulk of the cases arise from a human source of infection; that the majority of us are infected in childhood; that infection after three years of age rarely develops clinical signs of the disease in childhood, and that the adult type of disease as we see it arises from endogenous or exogenous reinfection. The problem generally confronts us either in regard to young adults seeking advice about marriage or in older married people who show evidence of tuberculous disease.

It is evident that if marriage were to be forbidden in every case of tuberculous infection, we would be shutting out from marriage the vast majority of the population.

The chief problem is in regard to young adults seeking advice on the question of entry into marriage, and this generally confronts us under one of two heads.

The first is the probable effect of marriage when one or both of the contracting parties have shown clinical evidence of pulmonary tuberculosis without having had tubercle bacilli in the sputum. They may have had tuberculous pleurisy with effusion, or a period of ill-health, with radiographical evidence of some active infiltration; but they are not in the infective stage, and careful examination reveals no evidence of active disease.

The second is the probable effects of marriage where one or both of the contracting parties are in the open stage and therefore infective.

The factors that should weigh with us are entirely different in these two classes of patients. Speaking from the preventive and not the therapeutic side, the main object in the first class is to prevent the patient's becoming infective, and the predominant factor is economic. In the second class the main thought is to prevent the spread of infection, and the predominant factor is infectivity.

The Effects of Marriage by Non-Infective Tuberculous Subjects.

The problem in the first class is mainly an economic problem. For whether we regard the signs of active disease as due to activation of a latent focus or to reinfection from without, the main point in prevention is the maintenance or heightening of resistance. Advice will therefore turn to the economic factor, and this affects the two sexes differently.

In the male, the important factors are his work and his home comforts. If married, he has to support two or more individuals instead of one, and he is more tied to his job. If this means longer hours, or more arduous or continuous work, less holidays, and more worry and strain, there is a much greater risk of the development of active disease. A great deal depends on the temperament and habits of the man; a great deal also on the character of his mate. If as a single man he has been living in lodgings, or not taking care of himself, and his mate is a good cook and home maker, these advantages would balance extra work. It is generally stated that such a man who marries is likely to live longer than if he had remained single, because he usually lives a more regular life.

In the woman, on the other hand, the chief factor is the risk arising from child-bearing and lactation. If she has been a wage earner and her prospective mate is in comfortable circumstances or good employment, marriage without pregnancy will probably give her more freedom and open-air life, and to that extent her resistance will be increased. Pregnancy, however, and especially frequent child-bearing and the drain of lactation, introduce new factors, the effect of which must be carefully watched. When in general practice I was struck with the number of women, aged between thirty-five and forty years, whom I saw from time to time with active pulmonary tuberculosis, who had married in the twenties, had three or more children, and now were feeling the effects of broken nights, increasing family anxieties and a family purse that was relatively less than at marriage because of increasing family expenditure without corresponding increase in income. Investigation in these cases nearly always showed a period of vague ill-health in late adolescence following a close contact with an infectious relative. Resistance at that time

had been sufficient to overcome the disease, but had subsequently been lowered by the strains of later married life. My point is that it is not sufficient in such cases for the medical practitioner merely to advise with regard to marriage itself; but the maintenance of general health must be reaffirmed from time to time afterwards.

In the ideal State scheme this would mean that the approval of marriage would be accompanied by advice as to reexamination at yearly intervals; and the difficulty would be to secure this. For these people will probably not have come under the notice of the State health department or even of the tuberculosis clinic. Well-to-do patients will probably keep in touch with their medical adviser; if this could be made certain, it would, I think, be a wise plan to secure their formal registration at the State tuberculosis clinic, so that they might be examined radiologically and that investigation of their progress in later years might be arranged if necessary. This would be difficult in country districts; but it would at any rate provide machinery for the detection of incipient tuberculosis and exacerbation of disease and for comparison with previous conditions.

The Hobart meeting of the Federal Health and Research Council recommended "the immediate treatment by State tuberculosis clinics of conditions suspicious of or leading to incipient infection". But the first essential of class treatment for such married women as I have mentioned would be respite from work. For patients, full pensions are recommended; but it would be more economical to give temporary pensions for these theatened breakdowns. The whole wording of the resolutions envisages only the man as "the wage earner"; but in this matter we are at present discussing, such pensions for women are just as important. The administrative difficulty is that the clinics are State institutions, while the pensions are matters for the Commonwealth.

I have entered into these details both at the time of marriage and in after life at the risk of appearing commonplace, because I wish to reemphasize my point that every patient must be dealt with as an individual and the fullest considerations be given to all these aspects of the patient's life. In our modern zeal for the prevention of disease, we are sometimes apt to lay down hard and fast rules and treat patients *en masse*. This is especially the case when they are dealt with in institutions and in large numbers. In this question of marriage there is a very important psychical factor, and disappointment and unhappiness consequent on unwelcome celibacy may have a more deleterious effect in lessening resistance than happy marriage under less ideal materialistic conditions. And in large institutions and clinics patients are so tossed round from one official to another that the patient, as an individual, is sometimes lost sight of.

Quite recently a woman came down from Newcastle Waters to our radiotherapy clinic for treatment for a chain of enlarged cervical glands which had been proved by biopsy to be tuberculous in nature. Although physical examination revealed no positive signs of disease, X ray examination of her lungs showed a questionable shadow at her right apex below the clavicle. She was four months pregnant. She received X ray treatment to her glands with benefit and the consensus of opinion at the clinic was that at that particular stage of pregnancy it was safer to leave things alone, but to keep her carefully under observation under favourable conditions. She accordingly was sent back to the medical ward for continued observation while treatment of the glands was going on. She returned to the clinic in July, two days before departing for Newcastle Waters and two months after her confinement, and to our surprise was found to be nursing her baby.

Detailed inquiries then showed that some nine years before, in Melbourne, she had for two months nursed her mother, who was dying of pulmonary tuberculosis. In 1935 she had had a chain of enlarged glands in the posterior triangle of the neck, for which tonsillectomy had been performed under ether anæsthesia. Fortunately for her she then went to Alice Springs and was married and afterwards lived at Newcastle Waters, where she led an open-air life and had abundance of goat's milk.

There she became pregnant, and the medical officer cut out a gland and sent it to the Alfred Hospital, where it was reported to be tuberculous. Thereupon she was sent to our radiotherapy clinic for treatment. When she was transferred to a medical ward the physician confirmed our judgement as to the wisdom of non-intervention; but she was seen by a specialist in tuberculosis, who tried to force her to have her pregnancy interrupted. She was anxious to have a baby and would not consent to this procedure. Her husband was fortified by another interview with the physician in charge. At seven months an obstetrician advised Cæsarean secion under spinal anæsthesia when she was near full term. But she kept well and at full term was transferred to the Queen's Home for delivery, which took place naturally. A week before this she had been shown to the surgical section. It is difficult to see why she was allowed to nurse her baby; but she stated that the obstetrician had consulted with the ward physician, who, however, was not the one who had previously advised her.

When the baby was three weeks old she reported to the clinic because of a lump in her breast. She was seen by the radium register, who sent her to the surgical ward to have an abscess of the breast drained. Again, without consultation with a physician, she was allowed to nurse her baby until she independently reported to the clinic before departing for home. But unless we had investigated conditions, she would have had no advice as to the proper dilution of goat's milk on arrival at her home.

Her glands had naturally enlarged again with the strain of lactation; but another X ray examination of her chest showed that the former suspicious shadow had disappeared. Inquiries showed that she had a careful husband and a comfortable home, and that she was possessed of initiative, as she had, in preparation for her long journey by train and motor care, substituted condensed milk for the cow's milk with which she had been supplementing the breast feeding.

This case is a complete illustration of the way things ought not to be done, from the time of the risky anæsthetic for the tonsillectomy.

A particular problem that sometimes confronts us is that of the patient who has had evidence of an active and possibly open infection that has retrogressed under modern methods of treatment, and who later comes for advice in regard to marriage.

The consensus of opinion is that in such cases marriage should be forbidden for at least two years after the resumption of full work. Some authorities say three years, and, of course, with the addendum that weight, general health and radiological appear-

ances show no evidence of recrudescence of activity. If there is any doubt, still further delay should be advised, and in the case of a female patient, the advice should include avoidance of pregnancy for at least a year or two till the effect of marriage without pregnancy has been observed. In the ideal campaign the same arrangements would follow regarding suspension as in the previous section.

I remember a man, suffering from hæmoptysis, who saw me in 1908. Hæmoptysis had occurred six weeks previously after he had run a closely contested race when out of training. His history showed that he had had pleurisy with effusion in 1898; he had been passed for service in the Boer War in 1900, had served through that, had been passed for insurance in 1902, and had since followed an indoor salesman's occupation without symptoms of ill-health. After a few months in a sanatorium, all physical signs had disappeared and his general health was very good; he was sent on a farm with light work for six months and again for another six months. He then returned to indoor work against medical advice because of his anxiety to get married. In a month he had a slight cough and an ischio-rectal abscess. This was drained and he was sent back to his farm. After twelve months of perfect health he resumed his old occupation unknown to me and shortly afterwards was married. He has never since shown any signs of trouble, although he has come up for examination at irregular intervals. This affords an example of the value of delay after the manifestations of active disease.

But whatever our advice regarding safety, every now and then we come across a case that shows how fallible may be our best advice.

A few months ago I was asked to see in consultation a woman with a history of pyrexia and headache for a fortnight. This proved to be due to tuberculous meningitis, from which she died ten days later. Inquiries on my first visit showed that some three years previously, when a probationer nurse in the same private hospital in which she was now a patient, she had had an attack of hæmoptysis. There had been slight signs of disease at the apex of her left lung, and the X ray appearances had been suggestive of active tuberculosis. With rest and treatment she had rapidly improved. She had been advised to relinquish her nursing, and had then had a long holiday in the country. She had been in perfect health for nearly three years and had become engaged to be married to a wealthy sheep farmer living in a healthy district, and had been actually on holiday for a month in this district immediately prior to the onset of her meningitic symptoms. Had my advice been asked a month previously, I could not have advised a better future for her than marriage under these conditions. In every case then, we can only deal with known conditions and recognize we are prone to error.

The Effects of Marriage by Infective Tuberculous Subjects.

The second class of case in which we are called on to advise regarding marriage is that in which there is clinical evidence of active disease and tubercle bacilli are to be found in the sputum. These patients probably will not seek advice, but advice must be thrust upon them.

Here the chief factor is the likelihood of the conveyance of infection, and if such patients are seen before marriage, I think all medical practitioners would be unanimous in forbidding marriage until they had ceased to be infective, and, in most cases, until three years after.

We have the experience to guide us here of those patients who become infective after marriage.

In 1911, the late Sir Joseph Verco read a paper compiled from his insurance records and his private practice and based on over 500 cases of married men and women who had died of *phthisis pulmonalis*. Two hundred and fifty-four husbands and widowers had died of pulmonary tuberculosis, and nearly half the deaths of their widows and former wives, respectively, up to the time of his paper, had been due to the same disease. Two hundred and sixty-four wives had died of pulmonary tuberculosis; but only 11% of the widowers had died of that disease. The women appeared to be three or four times as liable; nearly every other wife had fallen a prey to her husband's complaint, and only one man in eight had contracted the disease from his wife. He quoted figures from the Lumleian lectures of 1884 to the same effect. Although in the thirty years that have since elapsed we have gained much clearer ideas of the epidemiology of pulmonary tuberculosis and have much better control of the disease, both in treatment and in the prevention of infection, I do not think today's figures regarding marital infection, if accurate, would be greatly different. In addition, we have learned the risk to all family contacts, and the routine examination of children of tuberculous parents both at the Adelaide Children's Hospital and elsewhere shows that in children giving a history of family contact, 60% give a positive Mantoux skin reaction and only 40% fail to react, whereas only 10% of children with no such family contact give a positive reaction and 90% fail to react.

Something has been said recently of providing preventoria for such children, or for preference, making the home a preventorium. But if one parent is infective, it is difficult to see how the home can be made a preventorium.

The resolutions carried at the meeting of the Federal Health and Research Council at Hobart included the following:

The removal of the source of active infection from the family is of fundamental importance, since it is recognized that children are very vulnerable to the disease. This involves either the admission of infective patients to sanatoria or the removal of children from the home. Sufficient accommodation should therefore be provided in sanatoria for the treatment of all infective tuberculosis patients. Provision should also be made in suitable institutions for the acccommodation and treatment of children whom it is considered advisable to remove from their homes.

That the pensions paid to the tuberculous patients should be paid in full, irrespective of whether the patient is undergoing treatment in a State institution or not, in order that the nutrition of his family may be adequately maintained.

From the public health point of view, I do not regard this suggested provision for children as the best solution of the difficulty. These children will vary in age from infancy upwards. Fifty years ago this State abandoned the practice then current of maintaining in institutions or homes young children who were wards of the State and substituted the practice of boarding them out individually in approved homes, with consequent reduction in death rate and improvement in the health of children. Other States now adopt this method.

Many years ago France showed the advantage to health of removing the infants of tuberculous mothers to individual homes. Belgium later demonstrated the same thing. It would be much less expensive and more healthy than providing institutions if the State would follow the same principle for these children in tuberculous families as it has done with child wards of the State. The stay could be determined according to the mother's health. If her health improved, her pension should be continued after the return of the children to their homes so as to allow of assistance in the house. The almoner or visiting nurses of the clinic, or local board of health working under the supervision of the clinic, could supervise these arrangements.

Reverting to adults, McNalty quotes an investigation of Scott Pinchin into the histories of 166 married couples. In 38½% of these unions the infection had been passed from one partner to the other. He concluded that marital infection was much more common than was supposed, but was often benign. This benign form probably accounts for more favourable statistics in old figures, quoted by Rosenau in the sixth edition of his book on preventive medicine and hygiene; for all recent studies in which radiographic and skin tests have been employed bear out the truth of Verco's figures. Opie and McPhedan, for instance, who used X rays as a routine in addition to ordinary clinical examination and thus detected early lesions not yet manifest by symptoms or physical signs, reported on their results in 553 married couples in Philadelphia. Among the wives of husbands with tubercle bacilli in their sputum they found 35·5% with manifest or latent tuberculosis, while among the husbands of infective wives 45·6% had latent or manifest disease. In each case, the incidence was much higher than among the marital partners of patients with no tubercle bacilli in their sputum. They conclude that husbands and wives in marital contact with tuberculosis are infected from five to nine times as often as persons with no such contact.

With these figures in front of us, and remembering the constant and intimate contact entailed in ordinary married life and the innumerable opportunities that occur for thoughtless omission of details of accepted precautions against infection, I think we should be unanimous in counselling abstinence from marriage in these open cases. The only exception that I can see is the very special cases in which marriage is entered into by the healthy person with eyes open with the object of securing better attention or treatment for the patient. Such cases are in a separate category. I mention this because in these, as in all other cases, the psychical side cannot be disregarded. We can only advise to the best of our ability. In our zeal for the prevention of physical ills, we must not forget the part that sacrifice plays in developing the fuller life, and if an indivdiual advised by us to the extent of our knowledge prefers to go another way, we cannot forbid him; we can only attempt to minimize the risks. And in such cases we should always fortify our position by securing another opinion.

There remains the question of advice when a patient with active tuberculosis becomes pregnant. But that seems more in the province of obstetrics or medicine than preventive medicine or public health. One thing might perhaps be said: the risk to the mother was formerly felt to be so great that an active tuberculous process was considered a definite indication for interrupting pregnancy. Many obstetricians still feel the same; on the other hand, I find that many feel that pregnancy and normal labour are likely to be as well borne as therapeutic abortion. This very conflict of opinion at present puts the matter outside the province of administration. Much depends on the stage pregnancy has reached; much on whether it is a first pregnancy and the woman is anxious to have a baby; much on general conditions. Lactation, in my experience, is a much more serious drain on the tuberculous woman than is pregnancy, and in my opinion there should be no exception to the rule that, for the protection of both mother and child, no mother with active tuberculosis should be allowed to nurse her infant. If this were advised by the medical attendant and refused, I should not hesitate to use legal power, if available, to enforce it. For the health of the mother and the life of the infant are both jeopardized.

These are the cases in which I think legal power for segregation should be given. I cannot see how an ignorant mother, coughing up tubercle bacilli and looking after young children under school age, can avoid, in the majority of cases, spreading infection to her children and others. The same applies to careless fathers in an advanced stage of open tuberculosis, especially if of drunken habits. The present system of giving pensions to such parents while at home must maintain a continuance of cases. I agree with the recommendations about increase of pension, especially for patients in institutions; but in that minority of cases in which educative and persuasive measures applied to parents fail, I think legal power to compel segregation should be given. It should be carefully safeguarded and allowed only on the certificate of two medical practitioners and the order of a stipendiary magistrate, and the patient should have the right of appeal. But some such power is necessary as part of the campaign, and no discussion on marriage and tuberculosis would be complete without its being mentioned.

RENAL TUBERCULOSIS.[1]

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RENAL tuberculosis is always a secondary condition, and although the attendant symptoms may be the primary complaint in many cases, the kidney infection must always be regarded as a local

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

manifestation of a general disease. In a consideration of the kidney condition the mode of entry of the bacilli to the body is unimportant; but it is important to remember that in every case other organs have been or still are infected; to focus attention on the urinary tract to the exclusion of a full study of the rest of the body is illogical and unscientific.

For the purposes of this discussion I shall confine my remarks to the chronic or surgical type of renal tuberculosis. The acute miliary form is not of surgical interest. In an extensive investigation recently Lieberthal and Huth[1] concluded that tuberculous nephritis did not exist.

Incidence.

Medical and surgical statistics show that tuberculosis generally is decreasing, and, as one would expect, the improvement is paralleled, too, by the frequency of cases in which there is urinary involvement.

Early diagnosis in any tuberculous disease is the immediate responsibility of the medical profession, and an early appreciation of infection of the urinary tract makes treatment that is inevitably surgical so much more satisfactory.

Age.

In about 70% of cases the patients are between twenty and forty years of age. There appears to be little, if any, distinction between the sexes in incidence or prognosis. The condition is relatively rare in children and the outlook poor.

Symptoms.

The symptoms may be general or referred to the urinary tract. Symptoms referred to the urinary tract include frequency of micturition, dysuria, cloudiness of the urine, hæmaturia, and pain in the region of the kidney. Henline,[2] in a series he studied, found the relative frequency of symptoms as set out below:

Bladder symptoms	85%
Pain in kidney	76%
Cloudy urine	50%
Hæmaturia	44%
General symptoms	35%

Caulk[3] considered the initial symptoms and found frequency of micturition in 75% of cases and renal pain in 20%. At examination dysuria was found in 48%, while in 50% there was a history of hæmaturia. He concluded that "an unobstructed bladder in which stricture, prostatic disease, stone or gonorrhœa cannot be demonstrated and which fails to subside promptly to local treatment, should be regarded as tuberculous and complete investigations should immediately be undertaken".

A careful personal and family history will often confirm the need for such an investigation.

The general symptoms are those of chronic toxæmia.

Diagnosis.

In many suspected cases diagnosis may be extremely difficult, and particularly is this so when the renal lesion is not advanced. As early diagnosis is the ideal, so that the sequelæ and complications which almost certainly occur in late conditions may be avoided, it is well to take stock of the means available.

At the outset I would say that one must regard any patient, with symptoms suggestive of an inflammatory condition of the urinary tract and sterile pyuria, as probably having a tuberculous lesion. In such cases a diligent search should be made for the organisms. Their presence in the urine may be intermittent, so that repeated examinations of specimens collected over a period of 24 hours are often necessary.

Recognition may be achieved by: (i) Staining of the deposit in a centrifuged specimen, (ii) culture, (iii) guinea-pig innoculation. Seidman[4] concluded that guinea-pig innoculation was still superior to culture methods for the diagnosis of tuberculous bacilluria. The usual method of staining is the Ziehl-Neelsen process, in which advantage is taken of the acid-fast and alcohol-fast properties of the organism.

A full physical examination of the patient must be carried out, including X ray examination of the urinary tract. Caseation of an infected kidney may afford useful information. Excretion urography is useful in some cases, but falls far short of the retrograde method.

Cystoscopy must be carried out in every case. Often the appearance of the bladder and one or both ureteral orifices may be so typical of tuberculous infection that a positive diagnosis may be made. Vesical intolerance may be of almost any degree, whilst inflammation and ulceration about the interureteric bar, and a "golf-hole" fixity of the orifices, are found in no other diseases. Differential examinations of the urine from each kidney must be performed if catheters can be passed. I inject six cubic centimetres of a 0·4% indigo-carmine solution intravenously just before passing the cystoscope and find it a necessary aid to ureteral catheterization when much inflammation and ulceration are present. The time of appearance of the indigo-carmine is one indication of renal efficiency; the relative densities of the colour of the collected specimens is another. A more refined test is to collect specimens during the second hour after ingestion of a urea draught and estimate the differential concentrations.

Lieberthal and Huth in their work showed that in every case of renal involvement there was a diminution of renal function on the affected side. They found that indigo-carmine was not a sufficiently delicate test, and they used cryoscopy which gives an indication of the freezing point depression of the urine in degrees centigrade below zero. The thermometer used is calibrated in hundredths of a degree centigrade. Over one thousand cases of renal tuberculosis were investigated, and in every one in which tubercle bacilli were demonstrated in the urine of the suspected kidney a complete examination revealed lesions of that kidney. In many cases no pus cells were found

in association with the organisms. It is now generally accepted that tuberculous bacilluria means renal damage and the treatment is to be considered on surgical lines.

Bugbee[5] stated "no case has ever been reported in the literature where a kidney excreted tubercle bacilli and yet was free from tuberculous lesions". It would appear to be absolute that in every case in which urinary symptoms cause the patient to seek medical advice and tubercle bacilli are in the urine, there is a lesion of one or both kidneys.

The possibility of carrying infection from the bladder to a healthy ureter and renal pelvis is not, I think, very great; but it is a wise precaution to have sterile water or a weak antiseptic solution injected through the catheter during its introduction into the ureter. If a specimen of urine collected over 24 hours contains bacilli and positive evidence is obtained of infection of one kidney and not of its fellow, pyelography is not necessary. If pyelography is carried out great gentleness in filling the ureter and pelvis must be observed, as the least upset to the infected organ should be aimed at.

The pyelogram of an affected kidney varies, of course, with the degree of damage present. In an early case there is lack of definition of a minor calyx. If the condition is slightly more advanced, there is dilatation of one or more minor calyces with a broadening of the corresponding major calyx. Ultimately an advanced pyonephrosis is revealed, often with caseous areas scattered through the kidney substance, the whole drained by a dilated atonic ureter. In many cases of advanced disease the corresponding half of the base of the bladder at least is degraded and complete cure by nephrectomy is hardly to be anticipated. Unfortunately many patients come for investigation when the condition is very advanced. This state of affairs is partly due to late diagnosis and partly to the proverbial disinclination of the patient to consult a medical man, while he or she is still able to carry on. Tuberculosis may, however, be a "silent" disease.

I recently investigated a male patient who had received a blow over the left kidney and passed blood, and within a few weeks pronounced pyuria developed. Examination revealed advanced left renal tuberculosis with no typical signs in the bladder. X ray examination of the chest showed healed pulmonary tuberculosis. No tubercle bacilli were found in the sputum. The patient could recall no pulmonary symptoms and, until the injury, no urinary symptoms. He was relieved by nephro-ureterectomy.

Earlier diagnosis may be expected in many cases if tuberculous infection is considered when the triad of symptoms, frequency, sterile pyuria (by ordinary culture methods) and kidney ache, appear. The association of cure-all patent medicines and general radio advertising makes education of the lay public a more difficult matter.

Treatment.

When tubercle bacilli have been found in the urine and one or both kidneys prove to be infected, the patient must be considered as generally tuberculous and studied on general lines by a physician, who may or may not permit a surgical interlude in the management of the case. I can think of no greater need in medicine for teamwork and understanding between physician and surgeon than in making a decision as to whether or when a tuberculous kidney should be removed.

In a brief consideration such as this, broad principles only may be laid down for guidance. The primary lesions elsewhere in the body may be active, latent or healed. It is in the former that the cooperation of a physician is absolutely essential, and on him will rest the responsibility of consent or refusal to surgical intervention. Obviously in such cases the general prognosis must be considered very carefully, and it seems unnecessary to state that a major operation is contraindicated when the patient is losing ground on account of infection that is not to be arrested by that operation. When the extrarenal infection is active but apparently not progressing, removal of the urinary focus may prove of great benefit not only locally but also generally. It should not be necessary to remind our medical colleagues that nephrectomy in skilled hands is associated with a very low mortality rate, and if spinal analgesia be used together with a technique of gentle handling of the organ, the shock is negligible and the risk of activating a pulmonary lesion minimal.

The figures in connexion with immediate mortality shown in Table I are given by Thomson-Walker.[6]

TABLE I.

The Immediate Post-Operative Mortality Rate from Tuberculosis.

Author.	Year.	Number of Cases.	Immediate Mortality Rate.
Suter	1923	204	2·5%
Wildboz	1924	500	2·4%
Judd and Scholl ...	1924	863	2·7%
Thomson-Walker ...	1927	193	2·5%

Thomson-Walker also states that about 10% of patients operated on die of tuberculosis within two years, and after that about 3%.

To achieve a low mortality rate and a high percentage of cures, with relief of attendant bladder symptoms, early nephrectomy offers the best prospects. Medicine or surgery can do very little to prolong the life or ameliorate the condition of most patients who have had rental tuberculosis for any length of time.

When the general condition justifies surgery, and the infection is unilateral, nephrectomy should be undertaken forthwith, as the results are incomparably better than when medical treatment is adopted. Unfortunately an analysis of medical and surgical figures does not reveal the extent of the general infection, so that many of the cases in which medical treatment was used may have been too far advanced for surgical measures. There is no unanimity as to whether the ureter should be removed also.

I believe nephrectomy to be all that is necessary in the majority of early cases, and I have not yet, in the doubtful cases, seen any harm accrue from

delaying one's decision about the ureter for two or three months after nephrectomy. A deft surgeon, operating on a fit patient, may add little to the hazard by doing nephro-ureterectomy at one sitting; but he always adds something, and results of removal of the kidney alone in those cases would rather suggest that the ureter may be left.

Autonephrectomy or tuberculous renal occlusion does occur in some cases; but the factors contributing to this end are so incompletely understood that its occurrence, though worthy of note, does not help us in considering renal tuberculosis and its treatment.

No rules may be laid down when the infection is bilateral. Patients range from those who are so ill that surgery is not to be considered, to those who have one badly infected kidney, the cause of most of the symptoms and a handicap to its fellow. In the latter case nephrectomy would appear to be justified. Each patient must be considered individually and very often treated symptomatically. The general health must be improved if possible by general measures, such as rest, diet and sunshine. Tuberculin competently administered is essential.

Bugbee[7] reported two cases of undoubted tuberculous infection in solitary kidneys, in which the patients survived seventeen and eighteen years with complete freedom from urinary symptoms and with no tubercle bacilli in the urine for most of the time. The first patient was still living at the time Bugbee's report was made, and the second had died of cardiac disease. Bugbee rightly regarded surgery as the ideal procedure; but in quoting these two cases, he stressed the great importance of some supporting medical treatment.

Nephrectomy.

The operative technique in general is that of dealing with a pyonephrosis and pyoureter, with certain modifications.

The method of anæsthesia is a most important consideration. Active or latent pulmonary lesions may absolutely preclude inhalation ether. Complete relaxation is necessary, so that handling of the kidney may be reduced in a traumatic sense to a minimum. Spinal anæsthesia to my mind is the ideal, and when properly administered need cause no hardship to the patient or surgeon. The claims of "Cyclopropane" to being non-irritating and non-shock-producing appear to justify its consideration. Intravenous anæsthetics, such as "Sodium Evipan" and "Pentothal Sodium" are quite satisfactory when the nephrectomy is easy; but the possibility of the operation's being difficult and lengthy makes their routine use impossible.

The approach must be by the lumbar route and the operation performed extraperitoneally, as the field is a potentially septic one. The exposure must be free and the handling as gentle as possible. Many of the kidneys are extensively pyonephrotic, and rupture, which is to be avoided at all costs, is extremely easy. As much perinephric fat as possible should be removed with the kidney, so that the operation is an extracapsular one. Difficulty in freeing the pelvis and adjoining ureter may be expected, and the surrounding fat is often dense and adherent. The pedicle is often atrophic and does not present much difficulty unless the pelvis be adherent to it. All the lumbar part of the ureter should be removed, as a subsequent operation to excise the lower segment, if it has to be performed, is thereby rendered easy. Division of the ureter is best carried out by diathermy cautery, and care must be exercised to destroy by cautery the stump of ureter above the distal ligature. In the tensely pyonephrotic kidney it is wise to aspirate most of the contents through the cut end of the ureter, as freeing of the kidney is made easier and rupture becomes less likely. In cases with a great deal of perinephritic reaction the operation may prove to be most formidable and as a last resort subcapsular nephrectomy may have to be performed. Drainage must be employed and the wound repaired in layers.

After-treatment is vital, and must include supervision of the patient's health and activities for at least a year after apparent cure. The general resistance must be improved by rest, diet, fresh air and sunshine. When there are persisting lesions, the administration of tuberculin will be necessary. As it is rarely possible to excise all the tuberculous tissue, local treatment may have to be directed to the wound, the remaining part of the ureter, or the bladder.

The healing of the wound, the cure of ureteral lesions and the improvement of the condition of the bladder will take place in direct proportion to the general resistance of the patient. A persistent fistula in the loin has been described as a common complication. When it is established the blood supply to the area should be improved by heliotherapy. Excision and packing may be necessary in such an event.

Opinions as expressed in the various series of case reports as to how frequently the ureteral stump should be excised vary as much as the pathology encountered. Bugbee did not perform the operation in seventy-nine cases. Kidd,[8] on the other hand, stressed the necessity for complete ureterectomy in many conditions demanding nephrectomy, including renal tuberculosis. Latchman,[9] from his experimental studies on animals, concluded that the ureteral mucous membrane did not degenerate, and that obliteration of the lumen did not take place, and that when infection was present in the contents of the ureter it might give rise to periureteral infection. The problem must be approached with an open mind in every case. Conservative measures such as dilatation of any stricture and irrigation of the ureter have been reported upon favourably.

Generally the removal of a renal focus results in the cure of, or great improvement in, any bladder lesions. Some treatment, however, may be necessary, such as hydrostatic dilatation to improve interstitial cystitis, an indwelling catheter with irrigations to give complete vesical rest, or even fulguration to stimulate the healing of a chronic ulcer. The occasions when transplantation of the healthy ureter into the bowel on account of incurable spasticity of the bladder should be carried out would

appear to be very few. I personally have had little experience in the use of ethyl aminobenzoate, but have found it a useful bladder analgesic in a few cases.

The remaining healthy kidney may ache for some months after operation on account of its extra burden; but no treatment is necessary.

Pathology.

For practical purposes all renal tuberculosis is a blood-borne infection. Consequently both kidneys must be equally exposed to infection, and possibly equally infected; yet the lesions in the majority of cases are unilateral. The general tendency of the organs of the human body is to resist tuberculous infection, and often very successfully, and the kidney, so profusely supplied with blood and with an ability to form fibrous tissue, is surely no exception. No satisfactory predisposing factors, such as obvious damage or stasis, may be accepted to explain why one kidney is infected and its fellow escapes. It appears to me that in many cases of clinically unilateral disease both kidneys have been infected, as the exposure has been equal, and that a factor unascertainable by the known methods of examination makes one more prone to suffer defeat from the invading organism. Many urological investigations reveal a slight difference in the respective functions of kidneys and yet both would be considered within normal limits. Could there not be a slight anomaly of blood supply or anatomical structure which would render one organ less resistant than the other?

All the four kidneys removed by Pugh[19] for tuberculous infection during pregnancy were from the right side, and it is a known fact that during pregnancy the right kidney is subjected to the greater burden. Osler's application of the parable of the sower would appear to be equally as significant in local as in general infections.

The lesion is likely to become apparent at the base of a pyramid or the apex of a papilla. Urinary signs and symptoms are noticed after ulceration of a calyx has taken place. A faulty emptying and a degree of stasis occur, as the wave of contraction is no longer complete and rhythmic. The possibility of cure then becomes remote, as ulceration to a free surface breaks the surrounding zone of reactive tissue and in addition other areas of an already damaged kidney are bathed by tuberculous urine.

Specimens removed vary. The earliest lesions may be small grey ulcers at the site of the apex of a papilla, causing dilatation of the corresponding minor calyx; the ultimate lesion may be a complete pyonephrotic disorganization of the kidney in which shaggy masses of *débris* line each dilated calyx. The pelvis is degraded and non-contractile and surrounded by much hard fat. The pedicle is correspondingly reduced.

Summary.

1. Renal tuberculosis is always secondary to an extrarenal infection and is a local manifestation of that infection.

2. Frequency of micturition, renal pain, pyuria and hæmaturia are the commonest urinary symptoms.

3. A full urological investigation must be carried out in a suspected case, as the prognosis depends on early diagnosis.

4. Tuberculous bacilluria from a healthy kidney does not occur.

5. Nephrectomy, when possible, is the best treatment; but there must be full recognition of the value of supportive medical measures.

6. Initial bilateral infection would appear to be much more common than clinical pathology would suggest.

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RADIOLOGICAL DIAGNOSIS OF RENAL TUBERCULOSIS.[1]

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RADIOLOGY is essentially an ancillary branch of general medicine. In some fields of medical science radiology may provide the direct route to diagnosis; in others it may be merely a bypath from which the diagnosis is screened and glimpsed only faintly; in some it may even divert us to a distorted view of the case. In bracketing renal tuberculosis and radiology one may comparatively illustrate their relationships by using the etymological implication of ancillary: in bone diseases and pulmonary tuberculosis radiology is the general servant of diagnosis; in renal tuberculosis it is merely the under-parlour-maid, an accessory only, though undoubtedly a necessary one, in a large retinue of diagnostic hirelings.

The inference from these sentiments is not that the radiologist has an unimportant place in the team of medical men in the battle to reach a correct diagnosis in urology, but that in some cases a diagnosis can be made without radiography. Because of the extreme difficulty in diagnosing renal tuberculosis and because of the finely drawn and delicate

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

changes seen radiographically in this disease, I feel that the radiologist's position is much more important here than in the sphere of the more blatant and obvious bone or chest conditions. In urology he can give of his best by noting fine distinctions, and by displaying an active interest in the urologist's manœuvres he can cooperate with the best results. In no other disease does the radiologist covet more the pigeon-hole brain of the pathologist, the intuitive discrimination of the physician, and the diagnostic decisiveness of the surgeon; not only does he covet them, but he seeks to acquire them without obtruding them on his colleagues. When one comes to express one's opinions on the condition a comprehensive survey of the disease must be made. It must be approached from the angles of its ætiology, its pathology, and its treatment. Ætiologically, renal tuberculosis is a local manifestation of a blood-borne disease, and signs of its presence elsewhere must be considered, the pathological changes consequent on the various phases of its intrusion into the kidney must be understood, and treatment by renal extirpation is determined mainly from the evidence of its being unilateral or bilateral. Thus there will be an overlap of many of my remarks with those of the other speakers; but these remarks will be expressed as far as possible in concise, dogmatic and, maybe, didactic terms.

So consistent are the opinions of most of the writers that these statements may be considered as known facts concerning this condition. How they will be viewed in, say, ten years, I refrain from contemplating, since urology is in such a constant state of flux. To use a metaphor: the clear lotion of our knowledge of the present becomes turbid in the near future, being replaced again and again by that which is crystal clear. This, by expanding our field of vision, reveals fresh evidence, thus bringing us ever nearer the truth.

To repeat, there is very little that is conflicting to be found in the literature on the subject written within the last few years. For practical purposes, one may say that the lists are entered only on the question of methods: there is the excretion school and the retrograde school of thought. Those favouring the excretion method of urography make sweeping statements such as this: "Excretion urography, the pathological bacillus in the urine, and satisfactory blood retention tests are all the findings needed." Von Lichtenberg is responsible for this statement, and I do not doubt that in the hands of this master these are the complete desiderata. But for the medical masses much more is needed: for what radiologist is there (and I can exclude urologists, for there is none) who will faithfully say that he can diagnose with certainty the finer changes present in an early infection of a single calyx from excretion urograms? As a radiologist I certainly cannot subscribe to Von Lichtenberg's view maintaining that the peep into the bladder and the catheter specimens from both ureters are necessary, as also are the clear-cut static films obtained with the opaque fluid instilled under slight pressure. Some authorities tend to hedge on this question. Frequently, in reading the literature on this subject, one is told that excretion urography has proved of great assistance in the early diagnosis of renal tuberculosis, but that unfortunately it fails to outline minor deformities in the early stages. This conflicting statement has been read time and time again. Hamilton Bailey and Norman Matheson are definite: "Excretion urography has not proved of great assistance in the early diagnosis of renal tuberculosis." Sutherland and Braasch state:

> The recognition of early renal tuberculosis often depends on the visualisation of deformities in the minor calyces, and the lack of detail all too frequently encountered with excretion urography in such cases renders the method of doubtful value; in renal tuberculosis, therefore, retrograde urography is usually preferable.

I am not going to discuss the general indications for excretion urography, but will mention some of its advantages if it is used. Because of the excretion of the dye in visible concentration over a long period, posturing of the patient can be undertaken from time to time to get the best oblique views of the calyces, as suggested from previous films. This is tedious in retrograde pyelography, when the pelvis must be repeatedly filled and emptied unless one takes routine oblique views, which may not be suitable in the particular case. Pyeloscopy obviates this; but of this more anon. If the ureters are infected or have a stricture, these factors are shown by excretion urography, as also are pyelectasis and in some cases deformities of the calyces. A shortened ureter can be illustrated, and an irritable bladder with small capacity and irregular outline due to muscle spasms may be denoted. Autonephrectomy may be suggested because of non-excretion of the dye, and the function of a sound kidney is confirmed. As a preliminary reconnaissance it is useful when money is no object.

Oral administration of the dye "Hippuran" is in my opinion useless in an attempt to diagnose renal tuberculosis. "Hippuran" has its uses; but they do not enter into the scope of this paper.

Retrograde pyelography, provided it is not contraindicated in a general way, is the method of choice, as it can be carried out with a high degree of thoroughness and finish. Complete human control is retained: one instils the chosen type of dye in the prescribed concentration and quantity to suit the case. The blunderbuss method of injecting blindly, I feel, is an anachronism and should be scrapped, and pyeloscopy, with its delicacy of control under direct vision, should be used in all cases. Hamilton Bailey and Norman Matheson postulate that: "The injection must be made under screen examination." Because of the danger of pyelovenous reflux it appears to me that the filling of the pelvis of the kidney with a fluid injected under pressure is an unsafe surgical procedure if the operator is not looking at what he is doing. This point is stressed by the writers just mentioned. One of the most important advantages of pyeloscopy

is that at a glance one can see exactly where the tip of the catheter lies. There is no need for radiologists to emphasize this point, especially in the case of a diseased kidney. The posturing of the patient under a fluoroscopic screen and the taking of films from various angles are a great advantage derived from pyeloscopy.

When tuberculosis of the kidney is suspected the investigations in which radiologists are concerned more or less directly should be undertaken as follows (needless to say the urologist decides what steps should be taken):

1. The preliminary film is made. This may or may not give some information.

2. Since symptoms in renal disease are not necessarily experienced on the side of the lesion, catheterization of the ureters, with its associated cystoscopy, is performed, and specimens of urine are collected.

3. If tubercle bacilli are found in the urine of one side, the patient should again be examined by cystoscopy and an intravenous dye test should be made. Then a pyelographic investigation of the supposedly sound side should be made. The infection of the sound kidney by catheterization is a debatable possibility; most men of experience, I believe, do not think it can happen.

4. If tubercle bacilli are not found in the urine then pyelograms of both kidneys must be made.

To what degree can radiology help in the diagnosis, as obviously the detection of the tubercle germs in the urine and cystoscopic criteria are the main aids to diagnosis? X ray findings are either positive or negative; if they are negative further steps towards diagnosis may be made by either filling or surrounding the diseased part with an opaque medium. X ray examination can disclose pathological change, that is, the fact of morbidity, but it cannot indicate definitely the cause of the morbid state. By experience and deduction a pathological cause is postulated from the evidence presented, so that the best method, I feel, to show how radiology can help, is to itemize the various pathological states associated with infection of the kidney and discuss the radiological appearances which these various pathological changes present.

Boyd states that the conception of excretory bacilluria should be given up. In other words, when the urine contains tubercle bacilli, there is tuberculosis of the kidney. Therefore intensive search should be undertaken to discover as early as possible which kidney is affected. Of the pathological states, acute miliary bilateral renal tuberculosis does not concern the radiologist. Evidence of the ulcerative type, however, is discernible in the early stages by careful search of X ray films made during retrograde pyelography. This examination indeed may have to be repeated even the second or third time. The initial lesion may occur either in the boundary zone at the base of a pyramid or at the apex of a papilla. For some unexplained reason this primary manifestation of the disease is in one calyx at either pole, rarely if ever in a middle calyx. On the films there is some fuzziness of calyeal outline which at times may be difficult to distinguish from overfilling or injection into the tissues due to the catheter's having been pushed too far. Both overfilling, or the so-called pyelovenous reflux (I believe this phenomenon is merely injection under pressure into collecting tubules), and bayoneting with the catheter, can be avoided by visual control of the examination under the fluorescent screen. Thus the appearance presented by these misadventures should not occur with modern technique. If overfilling does occur, on general principles one may say that it can be distinguished from calycal erosion, because the latter gives a soft woolly shadow and overfilling causes a crenated sharper outline to the irregular dye shadow. Even before ulceration one may see a minor inflammatory dilatation of the pelvis; but this can be assessed only as an indication for subsequent reexamination if tuberculosis is suspected.

There is an acute anaphylactic œdema of the kidney due to tuberculous infection which causes it to enlarge. In a plain X ray film this may be detected; but one could hardly expect to diagnose tuberculosis from enlargement of a kidney. However, that tuberculosis can be the cause of enlargement must be borne in mind in a difficult case.

Cavity formation or tuberculous abscess in the cortex may be closed or open, single or multiple, and naturally it is the open type only that can be detected radiographically by filling with an opaque medium. In the late stages multilocular sacculation may eventuate; but this cannot be distinguished from the enormous dilatation of the calyces in a gross simple hydronephrosis.

Returning to the pelvi-calycal system we find that there may be an extension of the ulceration into the pelvis resulting in the dilatation of the pelvis and calyces. Diagnosis from pyelectasis due to some other cause is not possible on X ray appearances alone; but if it is merely a question of which kidney is affected, the answer is obvious by means of excretion pyelography, there being delayed excretion as well as anatomical distortion.

The effects of tuberculous infection on the ureters are three, all of which can be detected by excretion urography: (i) There may be atonic dilatation in the moderately early stages; (ii) the ureter may shorten, resulting in the golf-hole ureteric orifice; (iii) stricture may occur, due to local fibrosis.

Autonephrectomy due to fibrosis and shrinking of the kidney and occlusion of the ureter may be suspected from detection on the film of a comparatively small kidney on one side, and in this type as well as in the kidney destroyed by multiple abscesses excretion pyelography will give us the diagnosis of autonephrectomy. This charming and melodious but inaccurate term should be abandoned; but one could hardly hope to displace so lyrical an expression for one such as spontaneous devolution. Scattered calcification may occur in the cortex of the inert kidney, thus pointing to the probability of its tuberculous origin.

The question of calcification associated with tuberculous kidneys forms the theme of an

interesting article by Eisendrath in *Surgery, Gynecology and Obstetrics*, January, 1935. There are three main types, the first being subdivided. Included in the first subdivision are multiple scattered small areas, which may form elongated irregular faint streaks, or multiple punctate areas causing widespread stippling. This latter is due apparently to a healed miliary tuberculous infection such as one finds in the lungs.

The second subdivision includes soft shadows of irregular outline, filigree formations, and other calculous types with the smoothness and density of stones.

In the third subdivision are the large regular rounded shadows with variable calcification. These are due to calcification of *débris* in a large abscess. They may be dendritic when evolved from a multilocular abscess.

The second type is the calculus formation in a tuberculous kidney and the third is extrarenal shadows of tuberculous origin, such as of tuberculous glands. These can be distinguished from intrarenal shadows by taking films of the patient in different postures, and also, if they are in the mesentery, one may observe considerable changes in position at different examinations and phases of respiration.

Associated pathological changes can occur. Renal calculus and tuberculosis may exist in one kidney as independent entities, having originated at different periods. Wildholz has stated that one should suspect associated renal tuberculosis in every case of renal or ureteral calculus associated with infection. He found renal tuberculosis and nephrolithiasis associated in 14 of 1,000 cases of tuberculous kidneys, Crenshaw 131 in 1,817, but Brongersma 0 in 1,000. It is, however, difficult to distinguish between pre-tuberculous calculi and calculi of tuberculous origin. Carcinoma and tuberculosis of the kidney may occur concurrently.

In summing up, one may state that many cases of renal tuberculosis are diagnosed without the aid of radiography, that retrograde pyelography should be avoided if such a diagnosis can be established without it, that retrograde pyeloscopy and pyelography are preferable to excretion urography for diagnosing early infection, but that excretion urography is useful in the later stages of the disease.

DIATHERMY TREATMENT IN INDUSTRIAL INJURIES.

By J. KENNEDY, F.R.C.S.,
Melbourne.

IN recent years diathermy treatment has been widely used in dealing with all forms of injuries, such as sprains, strain, contusions, fractures *et cetera*.

Theoretically, the introduction of heat into the tissues as a local stimulant to the circulation could not fail to facilitate recovery of the injured part. It was difficult to apply if the injured part was supported in the time-honoured fashion by strapping, splints, bandages or plaster; hence in many cases these were discarded to facilitate the application of this new method of treatment. The idea that torn tissues required rest and support until healing took place, in many cases was regarded as belonging to an age that was past, and it was thought that electricity would more than compensate for the loss of such antiquated methods. Moreover, the old-fashioned methods, physiotherapeutic treatment, massage, manipulation, exercises and reeducation, appeared to be relegated to the background, and to a great degree electrical treatment dominated the clinics. The results were far from satisfactory. Reorganization of the clinics took place, and in some the two methods were combined; but in all big clinics of this nature, time was a factor; it was difficult to fit the two treatments for the patients into the given time. Moreover, the one entailed a considerable degree of physical and mental output on the part of the personnel, and the other, none at all; the machine did all the work while the masseur did something else. The results with various classes of injured men could not bear comparison with those of the older physiotherapeutic methods and further reorganization took place; and now in one large clinic, diathermy for the treatment of traumatic conditions has been completely relegated to the background. A demonstration of a large number of cases was given recently in this clinic showing results better and more advanced than any I have previously seen.

If one had unlimited time and the patient could have very frequent applications of the electrical treatment, there is no doubt that good would result. This would mean many applications a day, not one application for, say, twenty minutes every twenty-four hours; but this is impossible.

The question is raised: is diathermy, whether short or long wave, of any more value than application of any form of heat in the treatment of traumatic lesions? Torn and damaged tissues require rest and support until healing has taken place. They need massage for the remaining swelling and matting together of the tissues, manipulation for the adhesions, active use and reeducation of the muscles, and exercises to develop them. These methods must give rise to a greater circulatory stimulus than that given by electrical methods. Unfortunately, perhaps, they require the use of a skilled and specially trained personnel, whereas the use of the diathermy machine can be very easily acquired. There is no doubt that the latter has a very potent psychic effect on the patient; and perhaps also a solatium effect on the doctor in charge, for he feels that he is doing something to relieve the condition.

At the present time the question of the value of this type of treatment is very pertinent, since under

the recent amendment of the *Workers' Compensation Act* it can be charged for, and the accounts can be rendered to the employer. It is just possible that such accounts may be referred to the various medical officers acting for the employers. No insurance company could object to paying for necessary treatment, but exception may be taken to the application of additional therapeutic measures. If it could be proved to such employer that a reduction in the patient's disability or a loss to the company was to be obtained by such measures, no employer could object to the payment; but unless this can be done I can see difficulties ahead if they are forced to incur such additional expense. It is yet to be proved that diathermy has reduced the disability in any case or group of cases in any class of injury. Moreover, in the experience of certain companies in this State, damage has been done to patients through neglect or through carelessness in its application. The fact that prolonged disability caused by such damage in certain cases has been ascribed to the original injury in order that a scandal or Common Law action may be prevented has kept such incidents from becoming common knowledge. One views with alarm, however, the very great extension of the application of this mode of treatment since the last amendment of the *Workers' Compensation Act*. As a comparison of its value in injuries with that of other forms of treatment, I might quote portions of a short paper that I prepared two years ago dealing with certain industrial injuries and the periods of disability associated with them. To make it interesting, I compared the results of various groups of injuries in the years 1920 to 1925 with a similar group in the years 1930 to 1935. It should be noted that diathermy in the treatment of injuries had not been developed to any extent in the years 1920 to 1925, but was extensively used in the years 1930 to 1935. In one group of patients with back injuries of certain type the earlier period showed an average disability of eight weeks, the latter period an average disability of eight months. Various other explanations of this extraordinary disparity might be put forward, but the only outstanding difference in treatment in the two groups of patients was that one group was treated by the older physiotherapeutic method and the other almost exclusively by diathermy. Hence I must conclude that unless some very definite new evidence of the value of this method of treatment can be proved, it will be very difficult to force the employers to acknowledge these "accounts rendered" for diathermy treatment of injured workers.

If any reader of THE MEDICAL JOURNAL OF AUSTRALIA who is keen on this method of treatment could submit something more than hypothetical evidence of its superiority over older methods in reducing disability and economic loss in industrial injuries, he would materially help in solving a difficult and troublesome problem in this class of practice, the rehabilitation of the injured worker.

PELVI-RECTAL ABSCESS.

By E. S. MEYERS,
Brisbane.

IN one of the editions of Thomson and Miles's "Manual of Surgery" the following passage appears in relation to pelvi-rectal abscess.

> The clinical features vary with the nature and seat of origin of the abscess. In most cases they are those of an ordinary pelvic cellulitis, followed by the development of a localized abscess in the vicinity of the rectum; in other cases they resemble those of an ischio-rectal abscess. On digital examination of the rectum a swelling is found bulging towards the bowel above the level of the internal sphincter, and it may be extending beyond the reach of the finger. The treatment consists in opening the abscess at its accessible part, establishing efficient drainage and dealing with the lesion from which it originated.

This is the counsel of perfection frequently found when text-books are consulted for help in the solution of urgent and difficult problems. This was the case when I sought aid in the study of pelvi-rectal abscess, and it is the reason for my publishing the subjoined material.

Some of the difficulties of the subject will be made apparent by a study of the following case report.

G.F., a male, aged twenty-three years, a labourer, was admitted to one of my beds in the Brisbane Hospital on June 12, 1934, complaining of loss of rectal control of fourteen weeks' duration. The history of his illness was given in a letter to me from Dr. Hooper, of Eidsvold.

> The bearer, G.F., was horned by a cow about fourteen weeks ago. The cow's horn had previously been broken off short, and this led to a jagged wound about three inches deep through the anus towards the coccyx. He had a very severe hæmorrhage at the time and the wound was full of dirt and cow manure. In the third week he had three very severe secondary hæmorrhages, probably due to erosion of the gluteal arteries. The urine from the second to the tenth week contained albumin, pus and blood, but has been clear since then. There has been no suggestion of any abdominal infection apart from the kidney condition.

On his arrival at the Brisbane Hospital the patient was examined and was seen to be in poor physical condition. There was an indurated area on the left buttock with an opening through which fæces discharged. There was also an opening posterior to the anus, and this was in a very septic condition. Control of the rectum was very limited, and at times copious fæcal discharges came through the buttock. Lipiodol was injected through the gluteal fistula, and the subsequent X ray report stated that lipiodol could be seen in the pelvic cavity, but appeared to be in the rectum.

This was an unusual case, and therefore a search of available text-books was made and help was sought by consultation. However, the text-books were not very useful, and none of my colleagues had come across a similar case. The conclusion we arrived at was that an abscess had developed after the accident and that its position was above the *levator ani*.

As the patient was made miserable by the fæcal discharge through the buttock, a left-sided colostomy was decided upon. This was performed on June 21, 1934, and

gave great relief to the patient. His general condition improved and so did the local condition in the buttock.

Although the patient was progressing, in addition to his colostomy he still had his gluteal fistula, through which a probe could be passed into the pelvis, and although fæces no longer passed through the opening there was an occasional disagreeable discharge of coloured fluid. In addition to this trouble there was no possibility of closing the colostomy while the fistula persisted.

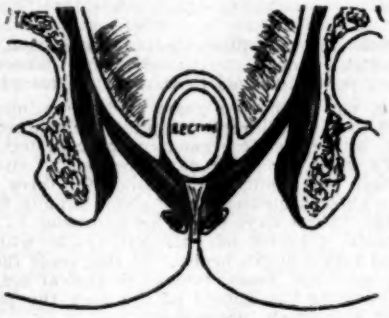

FIGURE I.

Coronal Section of Pelvic Fascia (Campbell's "Surgical Anatomy", Third Edition).

On August 12, 1934, a probe was passed into the wound in the left buttock towards the spine and an incision was made over the probe through the skin, the subcutaneous tissue and the *gluteus maximus*. The lower part of the gluteus was also divided. The pyriformis muscle was severed and most of it was removed. The effect of these procedures was to produce a saucer-like effect in the tissues by the division of the *gluteus maximus* into two parallel parts. The cavity so produced was packed with "Vaseline" gauze and the wound was dressed with double cyanide gauze.

FIGURE II.

Horizontal Aspect of the Pelvic Fascia (Campbell's "Surgical Anatomy", Third Edition).

The patient did quite well after this operation, and on October 31, 1934, he was allowed to return home and advised to go back to work. He was, however, asked to return to hospital for further treatment after a few months. On April 30, 1935, he was readmitted to hospital and gave us many hours of thought and consultation as to the best method of treatment.

On May 20, 1935, methylene blue was injected into the sinus and sigmoidoscopic examination showed that the dye was entering the bowel. A probe was next inserted through the sinus and was seen to be entering the rectum about three inches above the anus. It was now thought best to attempt to close the opening from within. The rectum was divided in the mid-line posteriorly to provide access. However, it was found quite impossible to get near the opening in the bowel. In addition it was very effectively concealed behind a valve of Houston. This line of approach was abandoned, but opportunity was taken to repair the damaged *sphincter ani*, which had been injured at the time of the cow's attack. It was decided to change the plan and to close the opening from without. The sinus track was widened gradually and traced down into the rectum by the use of Hegar's dilators. This was rendered possible by our previous operation on the *gluteus maximus*. The fistulous track was followed down to the pelvis, and at the point where it entered the rectum it was tied off with catgut. The wound was sutured and glove drainage was provided. By July 24, 1935, both wounds were well healed and the patient returned home.

On February 21, 1937, the patient reentered hospital, as he desired to have his colostomy closed. At operation a circular incision was made around the site of the colostomy and the bowel was dissected free from the abdominal wall. The skin edge was excised and the

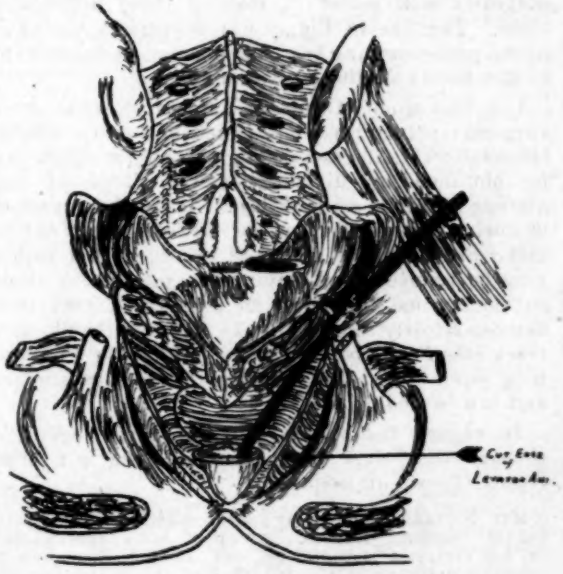

FIGURE III.

Path taken by probe in case reported (after Cunningham, "Text Book of Anatomy", Second Edition).

opening was oversewn. The wound was closed with a glove drain. A small incision was made just over McBurney's point, the caecum was delivered, the appendix was removed and caecostomy was performed. By the end of April both the colostomy and the caecoctomy wounds were healed and the patient was discharged from hospital.

If we consider a coronal section of the pelvis it will be apparent that the following important layers are in very close apposition: (i) the peritoneum, (ii) the pelvic cellular tissue, and (iii) the pelvic fascia. Now suppuration in the pelvic cellular tissue, or pelvic cellulitis, does not concern us at the moment, but a case will be reported later in which the pelvic fascia became involved as an extension from the pelvic cellular tissue.

When we consider the question of suppuration beneath the pelvic fascia, we are at once confronted

with the possibility of the spread of infection in a plane more or less at right angles to the one just considered. The limits of spread will be determined by the attachment of the fascia, by its strength and by the fluid pressure of the purulent material.

In the case reported above, the sequence of events appeared to be as follows: the animal's horn pierced the rectum above the plane of the *levator ani* but below that of the pelvic fascia. An abscess formed and the infection spread. Having reached the point where the *levator ani* and the *obturator internus* meet, the abscess burst through the fascia and tracked through the great sciatic notch into the gluteal region, eventually opening through the skin over the *gluteus maximus*.

One of the difficulties experienced in dealing with a situation like the one in question is that of visualizing the parts in three dimensions. The diagrams will assist in making these difficulties clear. The line in Figure III represents the path of the probe running from the opening in the rectum to the fistula in the *gluteus maximus*.

Use was made of quite a number of well-known surgical principles, but one or two require emphasis: (i) Access to the great sciatic notch can be obtained by division of the fibres of the *gluteus maximus* as described. (ii) The best method of curing a fistula of this sort appears to be (*a*) to make provision for drainage in order that sepsis may be reduced to a minimum, and (*b*) to allow sufficient time to elapse so that the fistula may develop a fairly thick wall. In this way the fistula's track itself will be the guide that can be followed to a point at which it enters the mucous surface and can be tied off.

In regard to the extension of pelvic cellulitis through the pelvic fascia, the following is a brief report of such an instance:

Mr. X came under my care suffering from peritonitis, resulting from an attack of acute appendicitis. On his arrival at hospital all that could be done was to insert a drainage tube. In spite of this procedure his condition continued to be very grave for many days, until it was noticed that he had a swelling in the ischio-rectal fossa. The swelling was incised, a drainage tube was inserted and a quantity of pus was discharged. From this moment the patient began to recover.

It would appear that the infection spread to the pelvic cellular tissue, thence through the pelvic fascia in the region of the "white line" and so into the ischio-rectal fossa. It is possible that this route would be a useful one for drainage in certain cases of peritonitis in the male.

Summary.

1. A contribution is made to the study of pelvi-rectal abscess.

2. A case of fæcal fistula through the *gluteus maximus* is reported.

3. An account is given of the method of bringing about a cure.

Reports of Cases.

SYMMETRICAL PERIPHERAL GANGRENE FOLLOWING SCARLET FEVER.

By NORMAN CUST, M.D. (Melbourne),
Melbourne.

THE following case illustrates a complication of scarlet fever which, though fortunately rare, possesses such dangerous possibilities as to warrant its recording.

J.H., a boy aged two years and three months, was admitted to the Children's Hospital, Melbourne, on April 16, 1936, with impending gangrene of both feet. He had been well until seventeen days previously, when a scarlatinal rash had confined him to bed for three days. He was then allowed up and played about happily for another two weeks. Three days before his admission to hospital a slight stain appeared on his left thigh, which slowly developed into a bluish bruise. At this stage the patient's brother, aged five years, contracted typical scarlet fever, thus confirming the nature of the rash the patient had exhibited a fortnight previously.

During the night before admission to hospital the patient was restless, and on his arising the next morning a slight limp was noticed and was ascribed to the bruise on his thigh. During that afternoon, however, the mother noticed patches of discoloured skin over the dorsum of each foot, similar to the bruise on the thigh. This discoloration spread so rapidly in the course of an hour, both distally to the toes and proximally up the legs, that she was alarmed and visited a doctor, by whom the patient was referred to hospital. During a two hours' journey the bruised areas continued to spread visibly, and swelling increased so as to necessitate removal of both shoes for comfort. There was no known trauma, and the child had never previously exhibited any purpuric tendency; nor was the family history significant with regard to hæmorrhagic diatheses. An inquiry into the patient's diet showed it to have been adequate in all respects, particularly in respect to vitamins.

On examination the child was seen to be acutely ill, with a temperature of 37·8° C. (100° F.) and a pulse rate of 140 per minute. The skin over the inferior extremities was a deep purple colour, mottled with dusky red areas, the legs, the feet and all the toes being equally affected. The upper border of this area was clearly demarcated from the normal tissues proximal to it by an irregular line running around the lower half of each leg. Firm pressure did not blanch the colour of this skin, which felt icy cold to the touch. The coloured areas were extremely swollen, with an œdema too tense to pit on pressure. No pulse could be detected in the posterior tibial arteries, although a strong impulse was felt in the popliteals, in both of which the systolic blood pressure (measured by the auscultatory method) registered 116 millimetres of mercury. The extent and distribution of the lesions in each leg were remarkably symmetrical, one being almost a mirror image of the other, as shown in Figure I. A small range of active movement still existed at the toes, with a somewhat greater range at the ankles; but all movements, whether active or passive, appeared to be painful. It was obvious at the first examination that gangrene was closely impending in these areas.

The bruise on the left thigh was by this time a discrete black gangrenous plaque, seven centimetres long by five centimetres broad, with a map-like edge, and surrounded by a faint ring of erythema. It was firm and dry, and could be "picked up" in the subcutanea, of which it appeared to involve the whole thickness to a depth of one centimetre (see Figure I). There were three small bruises and two petechiæ on the back. The hands were warm and of good colour; the systolic blood pressure in each arm was 115 millimetres of mercury; the heart sounds were normal and neither spleen nor liver was palpable. There

was no enlargement of the subcutaneous lymph glands. The urine contained no sugar, no albumin and no red blood corpuscles. Twelve hours later an examination of the blood was made: the erythrocytes numbered 4,500,000 per cubic millimetre and the hæmoglobin value was 75% upon the Sahli-Wert-Hellige scale (the normal value for this age being 80% to 85%), indicating slight anæmia only. The leucocytes numbered 21,000 per cubic millimetre. A film revealed 79% polymorphonuclear cells and an absence of eosinophile cells, which suggested a mild pyogenic response. The bleeding time was prolonged to seven minutes and the platelet count was reduced to 36,000 per cubic millimetre, but there was no decrease of capillary resistance as indicated by the sphygmomanometer test of Rumpell-Zeide.

The limbs were elevated in a hot-air bed and subjected to four-hourly swabbing with spirit. At no time after the patient's admission to hospital was there any extension of the boundaries of the existing areas of purpura, nor was there any evidence of further hæmorrhage, whether subcutaneous or free. On April 17, 1936, he was given intravenously a transfusion of 150 cubic centimetres of citrated blood as well as 17 cubic centimetres of scarlet fever antitoxin (Burroughs Wellcome) intramuscularly. On this date blood was taken for culture and later returned a growth of *Staphylococcus albus*, considered to be a contaminant.

In the succeeding twenty-four hours the legs darkened and became more œdematous, with large blebs appearing on the surface. At this stage a suggestion to incise the affected areas was considered, in order to relieve the tension under the fascia and thereby attempt to improve the venous drainage; however, this was not done, all movements were lost and gangrene soon became established.

FIGURE I.

Photograph taken on April 18, 1936, showing the symmetrical nature of the lesions on the feet, also the patch on the left thigh.

On April 20 the capillary resistance test was repeated, again with a normal result; culture of serous fluid from the blebs failed to grow any organisms, and the blood failed to react to the Wassermann test. In the succeeding two weeks the legs commenced to separate at the original line of demarcation, while the plaque on the thigh, pursuing a course of dry gangrene, separated *in toto*, like a "tanned burn". The smaller bruises on the back passed through the usual colour changes and resolved completely.

On May 4 the hæmoglobin value had fallen to 55%, coincidently with a fall in the number of erythrocytes to 3,338,000 per cubic millimetre; but the platelets had risen to 237,000 and the bleeding time was normal. During the whole of this period the patient had run a daily temperature of 37·8° to 39·45° C. (100° to 103° F.).

On May 5, with the child under anæsthesia induced by nitrous oxide and oxygen, Mr. D. O. Brown performed bilateral amputation. Flaps were cut two centimetres above the line of separation, thus leaving adequate stumps below the knees. An identical operation was performed on each leg, while a transfusion of 320 cubic centimetres of citrated blood was given concurrently. The post-operative course was uneventful. The temperature began to fall immediately and there was no trouble with hæmorrhage. The wounds healed in three weeks and the child was discharged on June 6. Three months later the stumps had consolidated and he was fitted with peg legs.

The child was examined again at this time and it was found that the erythrocytes numbered 4,390,000 and the platelets 352,000 per cubic millimetre. The bleeding time was two minutes. He had not shown any undue tendency to bruising or bleeding, and was walking well on his peg legs. Reexamined a year after his illness, he was well and free from further purpura. An examination of the amputated limbs by Dr. R. Webster revealed no evidence of a primary arterial embolus or of thrombo-angiitis.

The patient's brother, aged five years, was admitted on April 17 to the Queen's Memorial Infectious Diseases Hospital, Fairfield, where he was regarded as a typical scarlet fever case, the illness pursuing a course of no great severity. He was kept in bed until the fourth week of his illness and showed no tendency towards a hæmorrhagic diathesis. His bleeding time, platelet count and hæmoglobin estimations were examined and were all considered to be normal.

Comment.

Temporary states of purpura associated with thrombocytopenia are well recognized complications of infectious fevers, in discussions of which scarlet fever is usually given a prominent place.

The more severe cases (*purpura fulminans*) may exhibit areas of hæmorrhage so extensive as to result in gangrene.[1] The present case is put forward as one of these. Whitby and Britton include under *purpura fulminans* cases of extensive hæmorrhage, generally fatal, limited to the *tela subcutanea*. Dick *et alii* reviewed the literature in 1934 and found only sixteen examples of peripheral gangrene following scarlet fever.[2] Thus the incidence of gangrene after scarlatina is apparently very low, and the essential relation between the two in this case may be called into question. However, the temporary nature of the bleeding phase and the long remission subsequent thereto suggest something more than a coincidence. Tidy, speaking of this relation, says:[3]

> When associated with infectious fevers the hæmorrhagic tendency is transient, lasting only until . . . the infection has worn off—there will be no future tendency to hæmorrhages unless the same or a similar factor reappears.

Secondly, the hæmorrhagic phase of the present case made its appearance in the third week after the scarlet rash, a time when various other complications commonly ensue. Recent views suggest that the nephritis of scarlatina is an allergo-toxic phenomenon due to sensitization by the streptococcus.[4] It is suggested that the hæmorrhages of the present case may be due to the same factor causing an increased endothelial permeability, associated with a reduction in circulating platelets below a "critical level", leading to an exudation not only of plasma, but of whole blood. As the child was up and playing about at this stage, it is natural that the incidence of the bleeding would be greater upon the dependent vessels of the inferior extremities. Had he been kept recumbent, it is possible that he might have passed through the bleeding phase with nothing more than a few bruises and petechiæ. We have seen that the brother, who was infected presumably by the same organism, was kept in bed and showed no evidence of purpura.

The comparison between the two cases gives point to the old adage that "there is no such thing as mild scarlet fever".

It is noteworthy that, whereas the patch of gangrene on the thigh remained dry throughout, the lesions on the feet were œdematous from an early stage and pursued a course of "moist" gangrene, indicating venous obstruction. As there was no primary thrombosis, it is suggested that the intensity of the hæmorrhage gave rise to such tension under the fascia that the deep veins were obstructed, leading to œdema and an acceleration and extension of the gangrenous process to the deeper tissues. In view of this hypothesis it would have been interesting to see the result of an incision through the fascia, as was suggested, before

gangrene was absolute. Such an operation would not have been dangerous, as the bleeding phase had passed.

The brevity of the bleeding phase is curious. The child evidently had one attack of bleeding on the fifteenth day of his illness, which ceased for two days although he was still ambulatory. On the seventeenth day he suffered from a gross purpura for several hours, which ceased coincidently with his being put to bed in hospital. It is difficult to state what factor determined the cessation of bleeding at this stage, although blood transfusion and recumbency undoubtedly helped. The part played by the blood platelets in repairing injured endothelium is important and may have been decisive. In this connexion Tidy says: "The bleedings may cease as suddenly as they began—they usually recover without treatment."[20]

Summary.

1. A case of peripheral gangrene accompanied by temporary thrombo-cytopenic purpura is recorded.
2. The relation between this gangrene and a previous attack of scarlet fever is discussed.
3. A suggestion is made as to the mechanism of production of the purpura and its resulting gangrene.
4. Comment is made upon the necessity for strict treatment of apparently mild cases of scarlatina.

Acknowledgement.

My thanks are due to Mr. D. O. Brown for permission to record the history of this patient, who was under his care.

References.

(1) Price: "Text Book of Medicine", Fourth Edition, page 800.
(2) G. F. Dick, E. M. Miller and H. Edmondson: "Severe Purpura with Gangrene of Lower Extremity following Scarlet Fever; Recovery after Amputation", *The American Journal of Diseases of Children*, Volume XLVII, 1934, page 374.
(3) H. L. Tidy: "Treatment of Hæmorrhagic Diseases", *The British Medical Journal*, May 2, 1936, page 895.
(4) Boyd: "Pathology of Internal Diseases", 1932, page 411.
(5) H. L. Tidy: "Treatment of Hæmorrhagic Diseases", *The British Medical Journal*, April 25, 1936, page 850.

Reviews.

COMPARATIVE BIOLOGICAL CHEMISTRY.

IN his "Introduction to Comparative Biochemistry" Dr. E. Baldwin discusses briefly and lucidly certain chemical differences which distinguish the broader groupings of the animal world.[1] He then goes on to consider those biochemical adaptations which have made possible the migration of living organisms from their original home in the ocean to fresh water and to the land.

This portion of the book is mainly concerned with those mechanisms which have been developed for the control of the osmotic pressure and ionic balance of the tissues, and which have rendered the higher animals so largely independent of their external environment. These mechanisms became necessary when the organism found itself in environments which no longer were in all essentials similar to its body fluids. The author then discusses modifications of the excretory organs from the marine type in which urine isotonic with the environment is excreted, to the fresh water type in which the principal objects are the elimination of water and the conservation of salts by the excretion of a hypertonic urine, and to the land type in which the conservation of water has become of primary importance and a hypertonic urine is excreted.

Of particular interest is the biochemical evidence that the marine vertebrates had their origin in fresh water. The author also discusses the biochemical mechanisms adopted by the elasmobranchs and teleosts respectively in maintaining appropriate ionic concentrations in their tissues on their return to the medium which in the meantime had become hypertonic to their tissues with regard to salt content.

The sharp differentiation between the vertebrates (and certain Protochordata) and the invertebrates in an essential part of the mechanism of muscular contraction is discussed, namely, the use of creatine phosphate in the contraction cycle by the vertebrates alone, and of arginine phosphate by other phyla.

Respiratory and other animal pigments are then considered, and the material advantage possessed by animals which use hæmoglobin as their respiratory pigment is pointed out. The extraordinary extensions of its use made possible by enclosing it in a differentially permeable membrane are discussed. The very different problems of respiratory exchange presented to the aquatic animals living in an environment containing only about 0·5% of oxygen (by volume) and to the air-breathing animals, whose environment contains over forty times as much oxygen, are dealt with.

Although within the compass of the book the various topics can be discussed only in a cursory manner, this brief account of the development of certain biochemical mechanisms will be of considerable value in giving to the students for whom it is intended a wider view of the subject than is obtainable from the more detailed text-books. The book is sponsored by Sir Frederic Gowland Hopkins, from whose laboratory in Cambridge it comes. He commends it not only to undergraduates, but also to others whose interest may be great though their leisure be small.

[1] "An Introduction to Comparative Biochemistry", by E. Baldwin, B.A., Ph.D., with a foreword by Professor Sir F. G. Hopkins, F.R.S.; 1937. Cambridge: The University Press. Crown 8vo, pp. 130. Price: 5s. net.

CUSHNY'S TEXT-BOOK OF PHARMACOLOGY AND THERAPEUTICS.

THE popularity of "Cushny's Text-Book of Pharmacology and Therapeutics" has been such that it has now passed through eleven editions since its first publication in the year 1899; at that distant date it was recognized as being "the first severely critical, rigorously scientific, general text-book to be written in English by an experimental pharmacologist". Dr. Cushny, who died in 1926, may be regarded as a chief amongst the investigators responsible for the great increase in pharmacological knowledge which has been a feature of scientific medicine during the past twenty-five years. His studies on cardiac arrhythmias and his monograph upon the action of digitalis and its allies will stand as two contributions to knowledge which entitle him to lasting respect.

The present edition,[1] like its two immediate predecessors, has been prepared by Dr. C. W. Edmunds, Professor of Materia Medica and Therapeutics at the University of Michigan, in association with Professor J. A. Gunn, of the chair of pharmacology, and Director of the Nuffield Institute at Oxford. Very important revisions of the text have been found necessary in the present issue in order to bring the work into line with the eleventh decennial revision of the Pharmacopœia of the United States, and the task has meant extensive changes in the list of official preparations. The grouping of the various therapeutic agents discussed is, as in previous editions, upon the basis of their pharmacological action, though the authors admit that as yet no strictly scientific or completely logical arrangement of a large miscellany of drugs is possible in this way. It is difficult, however, to see how this plan could be bettered. The book is written in the authoritative but critical tone which marked all previous editions, and the information contained in it comprises the latest knowledge upon the most recent therapeutic agents. In particular, the section dealing with anæsthetic substances, including as it does articles upon the uses of properties of propylene, cyclopropane, and the chloral and barbituric acid groups, is alone worth the price of the volume.

[1] "Cushny's Text-Book of Pharmacology and Therapeutics", by C. W. Edmunds, A.B., M.D., and J. A. Gunn, M.A., M.D., D.Sc., F.R.C.P.; Eleventh Edition; 1936. London: J. and A. Churchill Limited. Medium 8vo, pp. 805, with illustrations. Price: 25s. net.

The Medical Journal of Australia

SATURDAY, NOVEMBER 13, 1937.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

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FIVE PENNYWORTH FOR FIVEPENCE.

VICTORIA today spends in each year fivepence per head of population on its university, and there are many indications that the effects of its parsimony will be, if they have not already been, dearly bought. A little over two years ago Dr. R. E. Priestley, M.C., M.A., D.Sc., was appointed Vice-Chancellor of the University of Melbourne. He came to the work with a high enthusiasm and a world-wide reputation. In the near future he leaves to accept the Vice-Chancellorship of Birmingham University because the Government of the State of Victoria will not grant to the University of Melbourne the minimum amount of money necessary to maintain even the standards of fourteen years ago. In 1923 the State subsidy for general purposes was £45,000 for 2,300 students, or £20 10s. a student; in 1935 it was £36,000 for 3,288 students, or £11 a student; today it is £47,500 for 3,750 students, or £12 13s. a student. Birmingham, with slightly less than half the number of students, receives from state and municipal sources £123,000 *per annum*, and the University of Sydney is assured of an annual government grant of £100,000.

Unsatisfactory as is the condition of the University of Melbourne generally, particularly in the medical school is the position to be deplored. The school, founded by Halford and brought to maturity by Harry Allen, has achieved for itself a reputation for sound and reliable teaching which has been upheld by its graduates in all parts of the world. There is a danger that this standard may not be upheld. The occupant of the chair of anatomy, Professor Frederic Wood Jones, an anatomist of international reputation, has stated that at Melbourne, for the first time in his life, he cannot do his work to his own satisfaction, and he has resigned his position. The professor of pathology may yet resign to engage in private practice; in twelve months the occupant of the chair of physiology retires. The salaries of all three men have in the past been too low. The Council of the University cannot hope to find suitable candidates for the vacant professorships if it continues its policy of fixing a uniform salary for all professorial appointments. It is customary in almost all universities for the professors of medical schools to be paid more than those in other faculties, for the simple reason that first-class men are offered more attractive emoluments in other branches of medical practice. The augmentation of salaries from outside funds is uncertain in practice and entirely wrong in principle. An applicant for appointment should know that his financial future is reasonably secure and guaranteed by the authorities of the university, and that he is not dependent on the private benevolence of interested well-wishers. Even from the narrowest point of view it can be argued that since medical students, compared with students in other faculties, pay a much higher proportion of the cost of their education, there is justification for the plea for higher professorial salaries. The problem has, however, broader aspects than can be covered by reference to salaries.

Professor Wood Jones, in his recent address, "The Spirit of Adventure", published in THE MEDICAL JOURNAL OF AUSTRALIA of September 25, 1937, showed clearly that: "In the ideal university

the professor should be the leader of an expedition into the most exciting and most romantic of all regions—the region of the intellectually unknown". The teacher is no longer an occupant of a chair from which he makes dogmatic statements to his students; he leads, or should lead, them in their work, be a student with them and remain a student throughout his life. If a professor is to fulfil that ideal he needs leisure, he must be freed from routine hack work and be supplied with a staff of assistants, adequate in number and properly paid.

The recent announcement that the sum of £50,000 will be available to the University of Melbourne from the estate of the late Miss Helen Mackie to supplement the salaries of medical professors will to some extent relieve the present position, but Melbourne still lacks chairs of medicine and surgery and a sufficiency of sub-professorial assistants. The American Council on Medical Education and Hospitals stated in *The Journal of the American Medical Association* of August 29, 1936: "The public should be brought to a realization of the fact that the well-trained physician is a costly product and that, unless medical education receives adequate public support, inferior medical service will be the inevitable result." Until the people of the State of Victoria realize the significance of that statement, they will receive exactly what they pay for—five pennyworth for fivepence.

Current Comment.

THE PRESENCE OF DIGITALIS IN BODY FLUIDS.

IT may seem to be a most uninteresting and academic inquiry to attempt to assay the digitalis present in the body fluids of patients who are, to use a modern and ugly term, well "digitalized". It might be argued that it really matters little what proportion of the digitalis is locked in the surplus fluids of the body and how much is available for fixation in the heart, there to carry out the work expected of it. Provided the desired result is attained and provided the patient does not suffer toxic symptoms, what does it matter? The answer is supplied by Maurice A. Schnitker and Samuel A. Levine, who lay stress on the very important bearing that digitalis present in the body fluids may have upon digitalis poisoning.[1] Numbers of authorities have pointed out that digitalis intoxication is more common than is realized, a fact also emphasized by Professor Meakins during his recent visit to Australia. It occurred to Schnitker and Levine that the occurrence of post-diuretic symptoms in patients who have been treated with the powerful mercurial diuretics might not be simply due to the withdrawal of fluid containing protein and certain crystalloids. That uncomfortable or even serious symptoms occur after the withdrawal of large amounts of fluid from the body is well known, and reference has been made in these pages not long ago to this syndrome, which includes such manifestations as headache, lassitude, drowsiness or even mental aberration, and also nausea and vomiting. Not only is such a train of events seen sometimes after the withdrawal of a large ascitic effusion for example, but it may also occur after the profuse diuresis induced by "Salyrgan" and other drugs of the merbaphen series. The interesting possibility put forward by Schnitker and Levine is that digitalis, if present in substantial quantities in the œdema fluid of a patient, might cause intoxication when this fluid was once more brought into the circulating blood on its way out by the kidneys. The possibility that the mercury in these diuretics might cause damage and produce the symptoms mentioned is not likely, for repeated use of these substances has been shown to be harmless when they are used with discretion. A shift in the electrolytes of the body is another possible explanation, but the authors do not think that this explains many of the cases observed by them. If the phenomenon of "redigitalization" really occurs, it would follow that digitalis must be present in the œdema fluid of the patients under review. These patients are drawn from a definite and common class, those suffering from congestive cardiac failure who have general anasarca and who have been treated by adequate and full doses of some preparation of digitalis. Digitalis has already been demonstrated in the urine by several workers. In order to attack the problem adequately the authors worked out a satisfactory method of extraction of digitoxin from the body fluids. It was not possible to obtain a satisfactory result with less than 1,000 to 2,000 cubic centimetres of œdema fluid, and the material employed was withdrawn from the pleuræ, the abdomen or the leg. In the method of assay the frog was used as a test animal and controls were set up by comparing the results obtained with the fluid under test with those obtained with dilutions of known tinctures of digitalis. It is interesting to read of one patient whose ascitic fluid was examined. She was suffering from an abdominal growth with peritoneal metastases, and after the ascitic fluid was found to give definite results on being tested for digitalis, inquiry established the fact that she had been given digitalis regularly because of myocardial inefficiency. Precautions were taken to exclude the possible confusion with calcium or choline in the fluid tested, and the evidence seems satisfactory that digitalis was truly present in the fluid. No purely chemical method of analysis was

[1] *Archives of Internal Medicine*, August, 1937.

found satisfactory. As the authors point out, further work is needed to confirm the idea that digitalis intoxication may arise from the reintroduction of body fluids into the circulation in congestive cardiac failure. Still, this work should make us think seriously on the subject of digitalis therapy: we are using a powerful drug with known toxic effects, and these cannot be disregarded.

A VIRUS AS THE CAUSE OF RHEUMATIC DISEASE.

EVER since Schlesinger, Signy and Amies in 1935 described virus-like bodies in the pericardial fluid of children suffering from acute rheumatic pericarditis we have been waiting for further reports in confirmation or otherwise of their findings. Such a conception of the ætiology of acute rheumatism is at once courageous and revolutionary and, if established, would call for a considerable change of outlook upon this question. A group of workers at the Lister Institute and at certain English children's hospitals have combined in an effort to elucidate this question. They are G. Hardy Eagles, P. R. Evans, A. G. Timbrell Fisher and J. D. Keith. They have increased the field of the original investigation referred to above, by the inclusion of patients suffering from rheumatoid arthritis and chorea in addition to those suffering from or resisting acute rheumatism.[1]

The method adopted was substantially the same as that followed in the isolation and identification of most viruses, namely, the preparation of suspensions of the supposed elementary bodies by differential centrifuging and solution of the deposit in saline solution containing a trace of formalin. Such suspensions were formed from pericardial and pleural exudates, from joint fluids, blood plasma, subcutaneous nodules (after grinding with sand), cerebro-spinal and ascitic fluid and filtered urine. As controls, pericardial and pleural fluid was obtained from patients with infections of known bacterial origin or found in transudates. These transudates gave a very small deposit on centrifugation, and fluid from traumatic synovitis none at all. On examination by dark ground illumination at a magnification of 1,000 diameters, innumerable small refractile particles, corresponding to those described by the previous workers, were easily seen. Further, to be brief, these particles were agglutinated consistently by the serum of patients recovering from acute rheumatic disease in all its guises, and in no case by the serum of the controls, which were selected to cover a wide range.

It must be recalled that suspensions prepared in the same way as those by Eagles and the other workers, but from non-rheumatic sources, contain particles indistinguishable on morphological grounds from known virus bodies, but contain in addition large numbers of particles of varying sizes and degrees of density. The richest source of the regular particles, which were of a size consistent with that of a virus and which were specifically agglutinated, was pleural and pericardial fluid. Suspensions from such sources as blood, urine, cerebro-spinal fluid, subcutaneous nodules and ascitic fluid contained relatively few of these particles and were unsuitable for agglutination tests. The authors also attempted a series of cross-agglutination tests by observing the effect of serum from a patient with rheumatoid arthritis, for example upon a suspension prepared from one with acute rheumatic pericarditis. The results suggest that it is possible that considerable cross-agglutination of this nature does occur, but the number of tests is too small as yet, and it is probable that a strict clinical correspondence would have to be found before this question could be satisfactorily answered. This aspect of the work bears an interesting relationship to the strongly suspected family resemblance between acute rheumatoid arthritis and acute rheumatism. From the clinical angle it is difficult to escape the conclusion that the two diseases are intimately and fundamentally related. It is apparently possible for positive cross-agglutination to be due to some other serological substance common to the two diseases, acute rheumatism and rheumatoid arthritis, and to have no bearing upon a common ætiology. Tillet and Francis, for example, showed that a substance, fraction *C*, probably a non-nitrogenous sugar isolated from pneumococci, was precipitated by pneumonia serum in the acute stage of the disease, by the serum of acute rheumatic fever and by serum from acute staphylococcal and streptococcal infections. Serum from any other source failed to precipitate this substance. It may be that some such relationship exists between members of the rheumatic group of diseases, and it would be unwise to insist that the findings of Eagles and his colleagues necessarily point to a strictly common ætiology. The titres for agglutination, even in the positive experiments, were quite low as judged by the standards adopted in bacterial disease; but such is a common state of affairs in the better-known virus diseases. An examination of the correlation, when possible, between recognized clinical evidences of rheumatic activity and agglutination titre leads to the conclusion that activity of the infection does not govern agglutination. It is not possible, therefore, to correlate the presence or absence of agglutination with any definite phase in the clinical condition.

The authors of this important piece of work do not make any exaggerated claims as to its import. They freely admit that the infectivity of the elementary bodies has yet to be proven. A great deal of circumstantial evidence and many careful histological and bacteriological studies have accused the streptococcus of playing the main rôle in the development of the rheumatic state, in whatever form it assumes. While clinicians will be intensely interested in the findings of Schlesinger and Eagles and realize their importance, they must endeavour to maintain an open mind upon the question of the infective agent in acute rheumatic disease.

[1] *The Lancet*, August 21, 1937.

Abstracts from Current Medical Literature.

MEDICINE.

Radiological Classification of Pulmonary Tuberculosis.

JAMES WATT (*Tubercle*, July, 1937) draws attention to the fact that the clinical classification of cases of pulmonary tuberculosis has hitherto rested on signs and symptoms, but that the modern development of radiography has made it imperative to classify cases mainly on information supplied by this diagnostic and prognostic aid. For convenience of description he advises that the lung field be divided into three zones by horizontal lines drawn through the lower borders of the second and fourth costal cartilages. He distinguishes between exudative and proliferative lesions, though admitting they are often mixed; so also may be fibrosis and cavitation, which can usually, though not always, be distinguished radiologically. His suggested classification includes the primary stage with an exudative focus and enlarged regional lymph glands, those cases showing pleuritic changes, and the main group, of "all forms of pulmonary tuberculosis subsequent to the primary stage but excluding the purely pleuritic and miliary forms"—in a word, phthisis. This group is subdivided into: (*a*) proliferative, (*b*) exudative, pure or mixed, but without cavitation, (*c*) exudative-cavernous, (*d*) fibro-cavernous, (*e*) fibroid, pure or calcified. For clinical purposes three groups are recognized. The first is the "minimal" group, characterized by discrete proliferative, exudative or fine fibrotic lesions, without cavitation and limited to a total area not exceeding a third of one lung field. The second is the "moderately advanced" group, characterized by lesions of the same kind and extent but with cavitation, or lesions of the same extent but confluent, or lesions of the same kind limited to a total area greater than one-third but not exceeding two-thirds of one lung field. The third group is the "far advanced" group, characterized by lesions of greater extent or severity. The author bases his classification on the view that the conception of the radiologist regarding the lesions shall not differ materially from that of the pathologist. This is especially likely in pulmonary tuberculosis when the radiologist often specializes in chest work or is himself a clinician and is thus able to translate what is seen on the film into the terms of the pathological conditions.

Oil of Wintergreen Poisoning.

CHARLES S. STEVENSON (*The American Journal of the Medical Sciences*, June, 1937) reports three cases of poisoning by methyl salicylate and the autopsy findings in the one fatal case. According to the literature, the mortality rate is 59%. The clinical features of the early stage are early vomiting, rapid and deep respirations, rapid pulse, cyanosis, flushed skin and extreme thirst; in the fatal cases there follow stupor, coma, impaired vision and hearing, convulsions and death in respiratory failure. The blood investigations show an average carbon dioxide combining power of 32·7 volumes *per centum*, a non-protein nitrogen of 70·2 milligrammes *per centum*, and 152 milligrammes *per centum* of sugar. Acetonuria is present and, in 60% of cases, albuminuria. Many specimens of urine show red blood cells and casts. There are no remarkable pathological changes which can be considered specific, the physiological being more striking than the anatomical changes. The renal function impairment and the lowered alkali reserve in the blood, the central nervous system depression, the interference with the carbohydrate, fat and protein metabolism are the more important disturbances. The acidosis is found to be mostly a compensated fixed acid acidosis, and is due to retention by damaged kidneys of urea and non-protein nitrogen, to an increase in blood amino-acids, in blood lactic acid and ketonæmia. The two last mentioned are apparently the result of impaired carbohydrate and fat metabolism, and are also, to some extent, due to the protracted vomiting. The ingestion of two to four times as much sodium bicarbonate as methyl salicylate helps to prevent the toxic action of the latter and to speed up its excretion. Glucose has a protective effect upon the kidneys, probably by its diuretic action. Ample fluids administered by all routes, together with sodium bicarbonate in large quantities, and insulin if hyperglycæmia is present, constitute the essentials of treatment. The lethal dose is four cubic centimetres for infants and six cubic centimetres for an adult.

Pilot Error.

A. L. BARACH (*The Journal of the American Medical Association*, May 29, 1937) discusses pilot error and oxygen want. Aeroplane pilots, especially if in poor health or suffering from neurasthenia or fatigue psychoneurosis, may be affected by oxygen-want at comparatively low altitudes. Impairment of vision is the earliest sign of oxygen-want, and may be noted in atmospheres equivalent to a height of 8,000 to 15,000 feet. Convergence, accommodation and eye muscle balance may be affected and a latent defect may be unmasked when oxygen-want occurs. Experiments in rebreathing have established the foregoing observations. Mental lethargy and fatigue are also symptoms of oxygen-want. It is suggested that oxygen-want may be a cause of the fatigue neurosis of pilots and that prolonged flying at altitudes of ten to twelve thousand feet may induce symptoms of neurosis. Barach describes a simple oxygen face-tent made of light transparent plastocele, fitting over the bridge of the nose and easily moulded to the patient's face, the oxygen being admitted through a perforated rubber tubing placed horizontally at the upper part of the mask. A flow of oxygen at the rate of three or four litres per minute produces a concentration of oxygen above 21% at an altitude of ten to twelve thousand feet; and six to eight litres a minute provide an oxygen concentration equal to that of the atmosphere at ground level for a pilot at eighteen to twenty-five thousand feet. A container of oxygen providing 110 cubic feet would provide oxygen at four litres a minute for two pilots for six hours. The weight of the container is 94 pounds. For this weight an additional factor of safety can be provided for the pilot and passengers. As the symptoms of oxygen-want are usually not noticed by the pilot, it is suggested that pilots should be compelled to use oxygen when flying at heights of ten thousand feet or higher on passenger services.

The Œsophageal Lead in Electrocardiography.

A. MCGEHEE HARVEY (*Annals of Internal Medicine*, July, 1937) has found that electrocardiography with an electrode suspended in the œsophagus behind the left atrium is sometimes of value in the diagnosis between paroxysmal tachycardia and auricular flutter with one-to-one response, and also whenever it is desirable to study the atrial complexes, as these are indistinct in the ordinary leads. The method was described in 1931 by W. Hurst Brown, who pointed out that the distance from the teeth to the left atrium was exactly four-thirds of the distance from the laryngeal prominence to the tip of the xiphoid process. However, the electrode is better placed by fluoroscopy than by metrical methods.

Diphtheritic Myocarditis.

A SERIES of one hundred patients with severe faucial diphtheria were subjected to electrocardiographic investigation by Norman D. Begg (*The Lancet*, April 10, 1937) for the purpose of determining the frequency of various heart changes in diphtheria and their prognostic significance. It was found that 84% of patients developed some electrocardiographic abnormality; these are discussed in two groups: (*a*) those showing evidence of myocarditis without a gross conductive lesion, (*b*) those showing an associated conductive lesion. Fifty-seven cases fell in the first group, of which 22% were fatal. Slurring of the *Q R S* complex, *T* wave changes and low voltage tracings were not of serious prognostic significance, whereas paroxysmal tachycardia not of sinus origin was not always fatal. Coronary thrombosis is an uncommon

event in diphtheria. Of the conductive lesions, heart block may occur as a transient feature; it may not be associated with a slow ventricular rate. It is characteristic of diphtheritic lesions of the main bundle of His that complete auriculo-ventricular dissociation usually appears without any preliminary changes in the *P-R* interval. There were twelve cases of complete heart block and six of bundle branch block; in both groups there was a 67% mortality. Intraventricular block is less serious in outlook, only 22% of affected persons succumbing. It is pointed out in conclusion that a normal electrocardiogram, especially in the early days of the disease, does not preclude a sudden circulatory collapse. At this stage the intravenous sugar tolerance curve remains as the most sensitive guide to prognosis.

Quinine and "Atebrin" in the Prevention of Malaria.

IN 1935 and 1936 the staff of the Institute of Medical Research, Federated Malay States, at the invitation of the Malaria Commission of the League of Nations Health Organization, performed experiments on the prevention of malaria by the administration of quinine and "Atebrin". The results of these are described by J. W. Field, J. C. Niven and E. P. Hodgkin (*Bulletin of the Health Organisation*, League of Nations, April, 1937). Observations were made on 1,253 persons at intervals up to one year. These were divided into three comparable groups. The first group was given prophylactic "Atebrin" at a dosage of 0·4 gramme a week (0·2 gramme on two successive days); the second group was given 0·4 gramme of quinine bihydrochloride daily; the third, which served as a control, an inert "Atebrin"-like tablet. It was found that prophylactic treatment with either drug effected a considerable reduction in the number of malarial attacks which might be expected from the incidence in the control group. In the last six months this reduction amounted almost to elimination. There was a rapid return of clinical evidences of malaria when treatment was suspended. This return occurred about two weeks earlier in the group treated by quinine than in that treated by "Atebrin". It was believed that this "post-prophylaxis" malaria was due to infections which had been hidden by the treatment. The effect of "Atebrin" on incidence and parasite rates was found to be somewhat more potent than that of quinine. The safety of the prophylactic use of "Atebrin" was not established, but it appeared that the risks are not of a high order. *Post mortem* examination of two persons of the "Atebrin" group, one an alcoholic and the other an anæmic boy, who died during the course of the experiment, disclosed fatty degeneration of the liver. The authors state that it would be obviously unjustifiable on the evidence either to exonerate "Atebrin" from blame or to assume that it was wholly or in part the cause of this liver damage. Two persons in the same group developed mental symptoms. Treatment with either drug lessened the incidence of abortion. This was greatest in the control group and was associated with attacks of malaria. "Atebrin" appeared to have no obvious ill-effect on pregnant women, but seemed to favour an increase in the number of live births. This was doubtless due to the suppression of malarial attacks.

Intensive Treatment of Yaws.

DESPITE systematic efforts at its control, the number of cases of yaws reported in Jamaica has steadily increased. In 1935 about 40,000 persons (almost 5% of the population) received treatment. George M. Saunders (*The American Journal of Tropical Medicine*, May, 1937) describes the measures taken to reduce the prevalence of the disease in a highly infected zone with a population of nearly 20,000. A specially trained field unit was organized, which carried out a survey and treatment in successively adjacent areas, with follow-up work at intervals. Before treatment was carried out in an area every person was listed and examined. Then a clinic was established, at which all persons showing lesions or who had a history of the disease within the past five years were required to attend. To test the relative effectiveness of "Neo-arsphenamine" and bismuth salicylate the patients in each area were treated with one or other drug. The bismuth preparation used was a 10% suspension, in olive oil, of bismuth salicylate powder, found by analysis to contain 57% metallic bismuth. This was administered intramuscularly into the gluteal region. "Neo-arsphenamine" was given intravenously in a 5% solution. Six treatments of one or the other preparation were given at weekly intervals in some areas, and four in others. The effect was greater with "Neo-arsphenamine", but the difference was not sufficient to offset the greater cheapness and ease of administration of the bismuth, which was also considered very satisfactory. Each area was visited again at intervals of from four to eight months. Effective control was achieved, and both the attack rate and the number of persons with lesions were substantially reduced.

Arteriosclerosis and Thrombo-angiitis.

A. R. BERNHEIM AND I. M. LONDON (*The Journal of the American Medical Association*, June 19, 1937) report the results of treatment of arteriosclerosis and *thrombo-angiitis obliterans* by intravenous injection of sodium citrate. Increased viscosity of the blood was noted in both conditions, and vasospasm was observed to be prolonged. Tobacco was forbidden, and exercise was allowed within the patient's limitations. A diet high in calcium content was given because of the favourable effect of calcium on vasospasm. Milk and cheese *plus* calcium lactate or gluconate were prescribed; and vitamins *A* and *D*, wheat germ or yeast and orange or tomato juice were given for their vitamin content. Postural exercises daily, the avoidance of cold, and soaking the limb in warm saline solution for thirty minutes once or twice a day were prescribed. Two hundred and fifty cubic centimetres of sodium citrate were injected intravenously three times a week for three months. A 2% solution was used. Chills, fever, nausea and vomiting were noted at times after the injection. These reactions were due to too rapid injections, insufficient cleaning of rubber tubing, or wrongly prepared solution. In 29 cases studied the blood calcium was found to be high—between 11·6 and 14·0 milligrammes per 100 cubic centimetres of blood; and the blood phosphorus was low—2·2 to 3·0 milligrammes. A low calcium diet was tried at first in these patients, but it was found that results were better with a high calcium diet. No serious ill-effects were noted from the sodium citrate injections or from the high calcium diet.

The Common Cold.

E. M. BOYD AND W. F. CONNELL (*The Canadian Medical Association Journal*, July, 1937) describe the results obtained by the use of essential unsaturated fatty acids in the relief of the common cold. Vitamin *F* is associated with and may be identical with linoleic acid; it is a substance necessary for the well-being of animals and man. On diets deficient in fat rodents fail to grow and to reproduce normally; their skin becomes dry and the hair becomes scanty; renal degeneration occurs. The symptoms are relieved by giving fat in the diet, but not by giving the fat-soluble vitamins *A*, *D* or *E*. Of the fats linoleic acid has been found to be the essential one. Linseed oil and soya bean oil contain large amounts of it, while mineral oil and cod liver oil contain little. The unsaturated fatty acid of the blood serum in man is diminished in fevers and infection and preceding the onset of the common cold, and Oncken reported that administration of oils containing unsaturated fatty acids prevented onset of colds and raised the serum level to normal. Five minims of a purified concentrated mixture of linoleic and linolenic acids were given to 41 young men thrice daily for seven weeks, after they had been observed for seven weeks previously to determine their liability to colds. Sixty-five other young men received no such treatment and were observed as controls. In this small experiment those treated with vitamin *F* suffered from fewer colds, which were of shorter duration than usual; whereas in the untreated the incidence and duration were unchanged.

Public Health.

THE TREATMENT OF PARALYSIS AT THE ELIZABETH KENNY CLINIC, ROYAL NORTH SHORE HOSPITAL OF SYDNEY.

THE following is a report of the Committee of Inquiry into the results of the treatment of paralysis at the Elizabeth Kenny Clinic, Royal North Shore Hospital of Sydney. The report is divided into two parts. The first part was presented to the Minister of Health, New South Wales, on May 15, 1936; the second part was presented to the Minister on September 3, 1937. The report is published by permission of the Minister and without any editorial emendations.[1]

PART I.

Formation of the Committee of Investigation.

1. In June, 1935, the Board of Directors of the Royal North Shore Hospital were requested by the Honourable the Minister for Health to house a clinic which would be under the direction of Sister Kenny, so that she would have an opportunity under medical supervision of carrying out her methods of treatment. The Board of Directors acceded to the request of the Minister to house the clinic and give all the necessary facilities, and at the same time requested that the Council of the Institute of Medical Research in the Hospital should appoint a medical committee to examine and report on the work of the clinic. They were to report to the Council of the Institute of Medical Research, who in turn would convey a report to the Board of Directors.

2. The Board intimated to the honorary medical staff of the hospital that they had acceded to the request of the Minister, and requested that the honorary medical staff of the hospital should give every possible help in this investigation. The honorary medical staff agreed to cooperate with the board in this work without accepting responsibility for the results of the treatment.

3. A committee of the honorary medical staff was then formed by the Council of the Institute of Medical Research, consisting of the following: Dr. W. W. Ingram, M.C., M.D. (Chairman), Professor H. Priestley, B.Sc., M.D., Ch.M., Dr. S. H. Scougall, M.B., Ch.M., Dr. E. M. Humphery, M.B., Ch.M., Dr. D. W. H. Arnott, M.B., Ch.M., D.P., Dr. A. R. Hamilton, M.B., Ch.M., M.Ch.Orth., Dr. A. L. Ducker, M.B., B.S. Dr. H. H. Harrison, M.B., Ch.M., F.R.C.S. (Edinburgh), was appointed medical officer of the clinic.

In order to get first-hand information of the objects of the clinic and also to obtain knowledge of the methods employed, an interview was arranged with Sister Kenny and was held at the hospital. (A copy of this interview, in the form of an appendix was attached to the report.)

It will be seen from a perusal of this shorthand copy of the interview that Sister Kenny states firstly that she makes no claims whatever and that she has relied entirely on the opinion of medical men with regard to the results of her work. She also submitted letters at the interview from Dr. Pincus and Dr. McDonnell, of Toowoomba, giving favourable reports on some cases.

Sister Kenny agreed also to select twenty-five cases representative of the cases attending the clinic, which would be a fair sample for intensive investigation by the committee. Sister Kenny also stated that she was not prepared to disclose her methods until the committee reported favourably upon her work.

Selection of Cases for Investigation.

It was agreed that twenty-five cases selected by Sister Kenny should be thoroughly investigated. Fifteen cases were selected by Sister Kenny and were examined by the committee. As fresh cases were arriving at the clinic weekly, it was decided that the further ten cases should be selected from those arriving so that the cases would be examined on arrival and there should be no period of treatment prior to examination. The cases selected are set out in the accompanying table.

Methods of Recording and Examination.

Owing to the time taken in examining cases with extensive paralysis, it was decided to divide the committee up into examining groups, each group to follow right through a number of cases. The group examiners were as follows: Group 1, Dr. Ingram and Dr. Scougall; Group 2, Dr. Hamilton and Dr. Arnott; Group 3, Dr. Humphery and Dr. Ducker. Professor Priestley to be called in when required in any particular cases. Dr. Arnott to be called in by any one of the groups when an opinion as to the mental condition of patients was required.

A special examination sheet recording the degree of deformity, including case history and progress, was drawn up by Dr. A. R. Hamilton, and was adopted as the examining sheet and is attached.[1]

The method of recording muscle power as drawn up by Dr. Scougall was adopted as follows. It is recognized that the recording of muscle power offers difficulty in the way of exact measurement, due primarily to variation in the patient, in changes of weather, mental states and tiredness. In any arbitrary approximation some divergence may occur between different observers and even with the same observer on different occasions. Due allowance is made in this regard, and for practical purposes muscle power

[1] Attached to the report are several appendices; these have not been published owing to lack of space.

[1] This was attached as Appendix 2.

Name.	Infantile Paralysis. *Recent.* Interval between Infection and Commencing Clinic Treatment. Months.	Infantile Paralysis. *Long standing.* Interval between Infection and Commencing Clinic Treatment. Years.	Cerebral Diplegia.	Date of Commencing Treatment at Clinic.	Date of First Examination by Committee.	Interval Between Date of Commencing Treatment and Date of Examination. Weeks.	Date of Second Examination.	Time Interval Between Examinations. Weeks.	Age of Patient. Years.
J.M. ..			1	8/1/36	26/2/36	7	2/4/36	5	6½
B.M. ..			1	8/1/36	12/2/36	5	2/4/36	7	6½
E.T. ..	7			23/12/35	30/12/35	1	3/4/36	13	28
N.C. ..			1	18/12/35	Approx. 7/2/36	7	2/4/36	8	6
L.D. ..		3½		6/1/36	21/2/36	7	1/4/36	6	12
H.E. ..		4		18/12/35	16/1/36	4	31/3/36	11	36
J.M. ..	11			17/12/35	24/12/35	1	31/3/36	14	13
J.P. ..	9			9/12/35	24/2/36	11	3/4/36?	6	2
E.S. ..			1	9/12/35	10/2/36	9	30/3/36	7	8
A.S. ..	12			10/2/36	2/3/36	3	2/4/36	4	30
E.T. ..		15		21/12/35	29/1/36	6	2/4/36	9	17
G.S. ..		6½		10/12/35	26/2/36	11	2/4/36	5	23
P.B. ..	15			23/1/36	12/2/36	3	2/4/36	7	7
A.H. ..			1	30/12/35	5/2/36	5	2/4/36	8	4
V.O. ..		6		2/1/36	20/1/36	3	2/4/36	10	22

is divided into five grades, with zero for complete palsy. The fifth grade indicates full power, and one, two, three and four intervening degrees.

The reeducation of the initial impulse and the increase in power in the following phase is so important that the first section has been further subdivided.

M.M. is taken to indicate that a voluntary contraction of muscle fibre is possible, insufficient to cause phasic movement at the joint under same conditions in the following paragraph.

Z.P. is taken to indicate the presence of phasic movement at the joint concerned, in a horizontal plane at right angles to gravity and with friction reduced to a minimum. Given range may be added.

A.G. is taken to indicate the existence of unassisted movement in the opposite direction to gravity. Given range may be indicated.

R.B. indicates a reaction to faradism (Bristowe) present.

Summation.—O. = zero, M.M. = minimal movement, Z.P. = zero-phasic movement, A.G. = antigravity movement, 1, 2, 3, 4, 5 = full power, R.B. = reaction to Bristowe.

For Estimation of Degrees of Deformity (Fixed or Spastic in Type).

Shoulder.—
Adduction or abduction: Degrees from right angle abduction either way expressed as angle short of or beyond right angle.
Extension or flexion: From the "attention" position.
External or internal rotation: From the position of upper arm at side, hand pointing forwards.

Elbow.—Flexion or extension: Degrees from continuation of line of humerus.

Forearm (elbow at side).—Pronation or supination: Degrees from mid-position between pronation and supination.

Wrist.—
Palmar flexion or dorsiflexion: From continuation of line of forearm.
Radial or ulnar deviation from mid-position.

Thumb (carpo-metacarpal joints only).—Flexion, extension adduction, abduction: Degrees of thumb from glass-holding position (approximate only).

Fingers and Metacarpo-Phalangeal Joints Thumb.—Flexion and extension: Degrees from continuity of proximal metacarpal or phalanx.

Neck.—Any deformity to be estimated from mid-position of head—"chin in, eyes front".

Spine.—
Scoliosis: Measure distance of apex of predominant curve from "plumbob" line, the latter to be taken through the natal cleft.
Kyphosis, lordosis: First, second or third degree.

Abdomen.—Ptosis: First, second or third degree.

Hip.—
Flexion: Thomas hip flexion test: angle between thigh and table.
Abduction, adduction: Degrees from mid-position.
Internal, external rotation: Degrees from hip 90°, and knee 90° position.

Knee.—Flexion or extension: Degrees from continuity of line of femur.

Foot and Ankle.—
Equinus: Degrees from right angle.
Varus, valgus: Degrees from mid-position.
(When varus and valgus can be partially corrected past mid-position, express as one or other in terms of angle from mid-position past which correction can be made.)
Calcaneus, cavus, clawed toes: First, second, third degrees.

Great Toe.—
Valgus: Degrees from line of metatarsal.
Hammer-Toe: First, second, third degree.

As far as possible, uniformity in method of examination was adopted and methods were freely discussed at weekly meetings of the committee.

Included in the report as Appendix 3 are fifteen special examination sheets in which are recorded the results of the examination of the patients under review. The findings at the second examination are recorded in the same sheets under the date of examination. It will be noted that in cases of infantile paralysis the power of the individual muscles of the affected parts of the body is set out in detail. In cases of cerebral diplegia a general description only of the case is set out.

On April 3, 1936, Sister Kenny again met the committee, when the question of the publication or demonstration by her of her methods was discussed. A copy of the shorthand notes of the interview is attached (see Appendix 4).

Summary.

In any evaluation of a method of treatment, the claims that are made on behalf of the method indicate one line of approach in investigation. Sister Kenny makes no claims herself other than that she gives a better service, but she draws attention to the claims said to have been made by certain medical practitioners, and a summary of these said claims is as follows:

1. That the method constitutes a better service in selected types of spastic and flaccid paralysis (Sister Kenny, Dr. Guinane, Dr. Pincus).

2. That in recent cases of infantile paralysis the results will be considerably better than those obtained by orthodox methods, even to 100% (Dr. Rountree).

3. That methods of immobilization are harmful in infantile paralysis (Dr. Guinane). (Memo: The examination of the third claim will also entail the consideration whether harm results from the absence of immobilization.)

4. That the method would not only restore the patient to health entirely, but would do so in the minimum time (Dr. Rountree).

The fact is to be noted that daily treatment for a half-hour, four days in the week, is given in the clinic in chronic cases, against half an hour's treatment three times weekly generally in public hospital practice in Sydney, that is, four treatments against three.

The following is a summary of each case examined by the committee.

Cases of Infantile Paralysis.

S.P.B., aged seven years. He had an acute attack of infantile paralysis in the right leg fifteen months ago. He was treated in hospital for one month with massage and splinting. He left hospital and had massage and reeducation for six weeks. Since then he had been treated by his mother.

He had not been under medical supervision for nine months before attending the clinic.

After three months' treatment at the clinic a comparison with the condition on admission shows a strengthening in action to normal from grade 4 in two muscles, and an increase from complete paralysis of one thigh muscle to grade 4, while in some of the intrinsic muscles of the toes there was a slight falling back in power. In seven muscles there was improvement from grade 3 to grade 4.

L.D., aged twelve years. Three and a half years ago she contracted acute infantile paralysis. The muscles of the abdomen, spine and right leg were affected. She was in hospital for eleven months and wore a caliper splint for two years, and now wears a leather jacket. Two years ago she was in plaster for four months to correct spinal curvature. There was marked scoliosis with shortening and wasting of the right leg. The anterior and lateral abdominal muscles gave a zero phasic response only.

On reexamination six weeks after commencing clinic treatment the right leg is stronger. The weak muscles of the abdomen and spine have not appreciably altered, nor has the spinal deformity.

H.E.E., aged thirty-six years. Four years ago he contracted acute infantile paralysis affecting both legs. He

was treated in hospital for one year, where his feet were manipulated under an anæsthetic ten times. He was discharged wearing caliper splints on both legs and using crutches. He has improved since returning home. He moves by swinging himself along, using a walking cage. His left leg is completely paralysed and there is considerable weakness of the right leg, abdominal and lumbar spinal muscles.

On reexamination two and a half months after the commencement of clinic treatment it is found that two muscles which were completely paralysed now give a minimal and anti-gravity response. All other muscles which were paralysed showed no improvement. Seven muscles which gave a weak response give a slightly stronger response. He still propels himself with a walking cage.

J.M., aged thirteen years. He contracted infantile paralysis eleven months before commencing clinic treatment. The left leg only was paralysed. He was treated at home under instructions from his doctor. His leg was splinted and exercises and massage were given by his father. In this case no muscles were completely paralysed, but he was unable to walk.

On reexamination three months after commencing clinic treatment it is found that all the weak muscles, with the exception of four, which have remained stationary, have considerably improved. One muscle, which gave an anti-gravity response on the first examination, gives a zero-phasic response on the second examination.

All movements of the affected leg are much stronger and he now walks unaided, but with a slight limp.

V.O., aged twenty-two years. A case of infantile paralysis of six years' duration. She said she was completely paralysed at first and could not move at all, and was treated at a private hospital in the country for some months. She had had no treatment for the past four years. On examination the right leg and foot were quite normal, both arms and the trunk showed a variable paresis, and the left leg was severely paralysed. She walked with a stick with considerable difficulty.

She was reexamined ten weeks after commencing clinic treatment. There is a general improvement in the weak muscles above the hips, but no improvement in the muscles of the left leg, *i.e.*, in the more severely paralysed muscles.

Two small muscles which gave no response on the first examination give a minimal movement on the second examination. Twelve (12) muscles which showed no response on the first examination, give no response on the second examination. Four (4) muscles which gave an anti-gravity response on the first examination improved to a reading higher in the scale on the second examination. Five (5) muscles of minimal, zero-phasic and anti-gravity response have not shown any improvement. Three (3) muscles showed a reading lower in the scale on the second examination.

The remainder of the muscles (not completely paralysed) showed either no change or a reading higher in the scale.

J.P., aged two years, was considered unsuitable for investigation.

G.H.S., aged twenty-three years, had an acute attack of poliomyelitis six and a half years ago, affecting both legs. He was treated with serum and splinting and was under medical supervision, for about two years. There was complete paralysis of the right leg and almost complete paralysis of the left leg. He walked with the aid of crutches.

Detailed examination of muscles three months after commencing clinic treatment shows that in the case of muscles completely paralysed there is no change. Five muscles which gave a weak response have shown improvement, while one muscle has improved from anti-gravity to 3. One muscle has retrogressed from grade 1 to anti-gravity. The patient still walks with the aid of crutches.

A.S., aged thirty years. This was a case of infantile paralysis of one year's duration. She had paralysis of the left leg which was complete below the knee. She had had about six months' indifferent treatment previous to attending the clinic. The right leg had been mildly affected, but had recovered completely within six months of onset.

She was examined one month after commencing clinic treatment. No appreciable change was found in the paralysed muscles. She showed some improvement in general condition.

E.T., aged twenty-six years, was afflicted with infantile paralysis on May 1, 1935. She was treated in a country hospital for six weeks and then in a metropolitan hospital for five months. She was very extensively paralysed in all her limbs and trunk. Before reaching the clinic she had not sat up. There was marked limitation of movement in the left wrist, flexion of the right knee was limited to 45° and of the left knee to 70°. There was limitation of flexion and abduction at the right shoulder, and dorsiflexion of the right foot was limited to 5° beyond the right angle.

On examination four months after commencing clinic treatment certain muscles which gave a nil response at the first examination improved to minimal, anti-gravity and 1½. Alteration in muscle power is recorded in the majority of the affected muscles to a variable degree, generally of a progressive nature.

This patient was extensively paralysed and exhaustion was readily produced by examination, so that considerable latitude has been allowed in the interpretation of muscle power. There is present some improvement in adaptive shortenings. She can now sit up and stand unaided.

E.T., aged seventeen years. This patient had an attack of infantile paralysis fifteen years ago. The right lower limb was affected. She had had orthodox treatment for six months only.

On examination it was found that the right lower limb was almost completely paralysed. She could walk unaided but with a marked limp. She had been using a walking caliper splint with a raised heel for fourteen years.

On the second examination, after nine weeks' treatment at the clinic, it is found that three muscles have improved from nil to anti-gravity. One muscle has improved from minimal to zera-phasic. One muscle has retrogressed from anti-gravity to zero-phasic, and another from minimal to nil.

The patient states that she is walking a little better.

Comment.

In ten cases of infantile paralysis examined in detail by the committee, it will be observed from the above summary that eight cases have shown some improvement in muscle power. Of the other two cases, one case was found to be unsuitable for reexamination on account of emotional instability, and the other showed no improvement in the paralysed limbs, but showed some improvement in general condition.

The investigation as regards the adaptive shortenings is as yet incomplete, but in one case in which it was looked for there was definite improvement.

In cases in which muscles showed no response at the first examination, some of these muscles have shown an improvement to a variable degree in subsequent examinations. A general improvement in the tone of muscles not paralysed has been also noted. The mental outlook of the patients in all cases has improved.

It will be noted also from a perusal of the examination sheets that the majority of completely paralysed muscles were not improved.

The committee has noted in the case histories that no patient examined by the committee has been treated exclusively from the commencement of paralysis until admission to the clinic by a recognized orthopædic surgeon. They have also noted that in some cases treatment prior to admission to the clinic was carried out in their own homes by relatives.

With regard to the results of treatment at the clinic in cases of infantile paralysis, the committee considers that the time elapsed is far too short for it to come to any definite conclusions with regard to a comparative evaluation of the method. The committee is of the opinion that one to two years' observation will be necessary, with controls, to enable a comparison in chronic infantile paralysis, while comparison in acute cases will not be possible until long after the next epidemic of acute cases,

so that some years must elapse before a final report can be made.

The committee has noted the remarks of Dr. Guinane in a report submitted herewith, that six cases of infantile paralysis treated by Sister Kenny within two months of onset all recovered completely without residual paralysis. It will be seen from the table attached herewith that the majority of cases under examination by this committee are of long standing, some up to fifteen years, and the most recent case was one in which treatment at this clinic was not commenced until seven months after the onset of the disease. It is therefore impossible to examine the statement of Dr. Guinane in respect to the efficiency of this form of treatment in recent cases.

Cases of Cerebral Diplegia.

N.C., aged six years, was a breech birth and a difficult confinement. Her head was not held up as it should be, and she did not sit up until two years of age. She has never been able to walk without assistance.

She is a bright child and able to understand commands, and her response to command is good. Her speech is backward. She walks on her toes with spasm of the right leg. She has a scissors gait and has to be supported from behind while walking. There is generalized kyphosis and she is unable to use her right hand. She can raise her right arm to the horizontal position only.

On reexamination after two months' clinic treatment, the kyphosis is less and she is now able to sit up unaided. She uses her right hand more and is walking less on her toes. She has walked for short distances unaided.

E.S., aged seven years and eleven months. This was a case of cerebral diplegia with generalized agenesis, but with no spastic deformity. He was supposed to have had a hæmorrhage at birth. He was mentally deficient, nervous and excitable. There were generalized, jerky, incoordinate, involuntary movements present. He would lift his head and straighten his back, but fell forward after a few seconds. He could stand by supporting himself on some fixed object, with wobbling and unsteadiness. He was unable to walk, but could advance one foot in front of the other when supported. There was a tendency to scissors gait, but he was able to separate the legs when encouraged.

On a second examination seven weeks later he showed an improvement in his emotional state and a lessening of the incoordinate involuntary movements, more especially when lying down. He was able to sit up a few seconds longer than at the first examination. There was no improvement in the intelligence.

B.M., aged six years and ten months. The first of twins. He was unable to hold up his head until twelve months old, and did not sit up until three and a half years of age. He commenced to walk at five years. His mother noticed a stiffness of the right arm and right leg, and to a less degree of the left arm and left leg, when the child was about nine months old. He commenced to talk when ten months old, and now talks well and has good comprehension. He was unable to dress himself and has difficulty with feeding.

On the first examination there was a generalized curvature of the spine and a slight limitation of movement of both elbows and both ankles and of the right shoulder. The patient walked with a wide gait, with knees, elbows and wrists in a flexed attitude. On attempting to pick up objects there was marked incoordination of the right hand and to a less degree of the left hand.

Reexamination after five weeks' treatment showed the spinal curvature to be about the same and the attitude in walking unchanged. The limitation of movement in the joints noted was somewhat improved, as was the incoordination in the upper extremities on attempting to pick up objects.

J.M., aged six years and ten months. The second of twins. He was unable to sit up until fifteen months old. He walked at two years and had numerous falls. Upon the first examination at the clinic he did not talk clearly, but had good comprehension. He was able to dress himself and attend school. The child was unable to stand still and swayed from side to side. Was able to pick up objects well, but made a gross movement to perform small actions. There were no incoordinate movements and no spasm, except at the ankle joints.

On the second examination, after seven weeks' treatment at the clinic, the patient stood still without swaying, and on picking up objects the movements were more refined.

A.N.H., aged four years. First child, instrumental birth. The child did not attempt to sit up until three years old. He has good comprehension, but has difficulty in talking and can say a few words and most of the alphabet.

On examination there was a generalized curvature of the spine. He was unable to walk by himself because of incoordination and choreic movements, which also interfered with such actions as grasping a pencil. He was unable to sit or stand without assistance. He was ill-nourished and had a generalized increase of tonus.

On a second examination two months later the incoordinate movements are improved and the general appearance is better. Otherwise there is no change.

He was recovering from a severe cold on the second examination and was reexamined a third time four weeks later, when he could then sit up, but with considerable incoordination.

Comment.

All cases of cerebral diplegia show some improvement, more especially in regard to incoordination and involuntary movements. There has also been some improvement in the emotional state in two cases. We would advise that the improvement in cases of cerebral diplegia be regarded with reserve, since it is recognized that these cases are less emotional on acquaintance with the examiner and surroundings, with consequent lessening of spasticity and incoordinate movements, and further examinations will be necessary before making reliable deductions.

The results of treatment of cases of infantile paralysis and cerebral diplegia need accurate comparison with those obtained under orthodox procedure. Control cases under orthodox treatment are therefore necessary for comparison as to the results of treatment. The committee has arranged for the examination of a series of control cases at other hospitals under orthodox methods and similar conditions.

It is considered also that a knowledge of the rationale and access to the patients whilst under treatment would accelerate conclusions.

PART II.

This report should be read as an addendum to the previous report of May 15, 1936.

The case history sheets with the detailed examination of the patients are not included, but they can be procured if desired from the Secretary of the Royal North Shore Hospital of Sydney.

Notes on the Individual Cases of Infantile Paralysis.

S.P.B., aged eight years. The patient is too young to make a statement and the parents were not interviewed. The right lower extremity only is affected.

Since the last examination several muscles have improved from grades 3 and 4 to grades 4 and 5, while others have remained stationary. Improvement has been maintained since the previous examination and the child is now walking with only a slight limp.

L.D., aged thirteen years. Since our last examination the patient states that she feels better. She thinks she is able to hold herself more erect.

On examination it is found that the ptosis of the abdomen is less marked. The right leg is stronger and she walks better, but still has considerable scoliosis. She is wearing a hip pad.

H.E., aged thirty-seven years. This patient had to give up treatment on account of lack of finance, and he is now in the country and has not been reexamined.

J.M., aged fourteen years. This patient is now living in Melbourne and the committee was therefore unable to reexamine him. Dr. T. F. Ryan, F.R.A.S., F.A.C.S., of

Collins Street, Melbourne, was communicated with and asked to examine this boy, and his report is attached. (See Appendix I.)

V.O., aged twenty-three years. The patient states that she is stronger all over with the exception of the left foot; that she walks much surer but that she cannot walk without a stick.

With regard to individual muscles, we find that some of the less severely paralysed muscles have improved since the last examination and two have retrogressed.

All muscles with a nil or minimal movement have not improved apart from two muscles at the hip joint whose function it is difficult to dissociate from that of other muscles. Whilst the muscles of the foot whose function can be readily estimated and most of which gave a nil response showed no improvement.

G.H.S., aged twenty-four years. Since our last report it is found on examination that a number of muscles have improved from a lower to a higher grade. It is also found on examination that five muscles out of twenty-eight have now improved from nil to a minimal or zero-phasic movement. Two other muscles have improved from a minimal movement to an anti-gravity or grade 2 movement. The patient is still using crutches and cannot walk unaided.

A.S., aged thirty-one years. The patient states that she is marvellous and can walk without the support of a stick; that she can walk fifty or sixty yards; that she limps a little and that the back is stronger and now practically straight.

The patient wears her caliper to and from the clinic. Examination reveals that although she walks without a stick or caliper, she does so with care and with a lurch to the left. In this case four muscles have improved, the quadriceps having improved from zero-phasic to anti-gravity plus movement. All other muscles found on examination to be paralysed and partially paralysed have not improved. We consider her ability to walk without a stick or caliper due to locking of the hip and knee in extension, and to the improvement of the quadriceps.

E.T., aged twenty-seven years. This patient states that she is much happier in her present surroundings. She has been optimistic and willingly cooperates with her nurses. She also states that her general health is better.

She has had a wide-spread paralysis as shown in the original report and there was also present some splint stiffness and postural deformity which has improved. The improvement in this case has been marked.

E.T., aged eighteen years. She had attended the clinic three months before the first examination. She was then examined three months later and again reported on. Ten months have now elapsed and it is found that the improvement has been maintained. Six out of eight muscles which gave a nil response at the first examination have now improved to minimal, anti-gravity or zero-phasic movement. She is now walking much better.

Comment on the Cases of Anterior Poliomyelitis.

The committee in their last report stated that they were unable to come to a definite conclusion because of ignorance of Sister Kenny's method of treating these cases. Since then Sister Kenny has published her book and the committee has inspected the clinic on several occasions, so that it is now familiar with the methods of treatment of infantile paralysis employed by Sister Kenny.

It is evident to the committee that: (i) All the cases of infantile paralysis have shown improvement since the last examination. (ii) The patients treated at the Elizabeth Kenny (New South Wales) Clinic are very optimistic and that the treatment given to the individual cases by Sister Kenny's trainees is conscientiously performed. (iii) The Elizabeth Kenny (New South Wales) Clinic is well organized. (iv) With the exception of one case, about which final conclusions have not been reached, trick movements were not observed in these chronic cases. (v) Some of the deformities and joint stiffness in a number of the cases have improved.

Notes on the Individual Cases of Cerebral Diplegia.

N.C., aged seven years. Walking has considerably improved. The child is much calmer and uses the right hand more. The adductor spasm is still present. In picking up objects with the right hand she uses all fingers and does not hook up objects with the thumb. There has been a steady improvement in the condition of this patient, both as regards decrease of muscle spasm and functional power of the limbs.

E.S., aged nine years. Sister Croll says that the patient has improved, but not a very marked improvement. She says he is much quieter and able to control his movements better but really cannot stand alone. The father is over optimistic about the child's improvement. There are still some incoordinate spontaneous movements when lying down, made worse by noise. He cannot raise himself to a sitting position unaided. He sat unsupported for forty seconds, and during this time the incoordinate movements of the arms were more marked. He cannot stand unsupported or walk alone, but, if held, can place one foot in front of the other, but with still some tendency to scissor gait. This is not quite so marked as on the first examination. He was unable to pick up objects with the right hand, but made a better attempt with the left hand and managed to pick up a ruler after a long concentrated effort. He still has adductor spasm and slight calf spasm. This may be a shade less, but it is difficult to evaluate and varies from moment to moment.

B.M., aged seven years. The mother states that the child shows general improvement. Since the last report we notice there has been slight general improvement of coordination. He can now pick up objects quite well with the left hand which originally was by far the better of the two. There is improvement also in picking up objects with the right hand, there being less incoordination; but the patient still grasps the objects between the dorsum of the thumb and the palmer aspects of the fingers. Walking is a little better though he still walks with a wide base and pronation of both feet, and with a flexed attitude at the knee and hip. The elbows and wrists are still held in a flexed attitude when standing and walking with the forearms pronated, but to a less degree than formerly. The kyphosis and scoliosis are about the same. The patient can speak a little better and can answer questions more intelligently. Although calmer he is still easily upset.

J.M., aged seven years. The mother states that the child shows general improvement. As noted in the previous report, the child can raise himself to the sitting and standing position and dress himself with difficulty. There has been improvement in these actions. He can turn over without difficulty. Walking has improved, although there is still some ataxia and the patient can run. He can pick up objects with both hands with more refinement of movement. Speech is clearer and generally the patient appears calmer. There has been general all-round improvement since the last examination.

A.N.H., aged five years. There is no statement from the parents. There has been some slight general improvement since the last examination. Spasm is not so marked and, while there is still considerable incoordination, it is less than when he was previously examined. He is a little calmer, but still easily excited and upset in the presence of strangers. He can now sit up unaided from the supine position but is unsteady and prefers to support himself by holding on to something. He can now roll from his back onto his stomach. He is still unable to stand by himself, but when supported can make attempts at walking. Speech is still difficult to understand but a little clearer, and he can give simple answers such as "I don't know" and "yes, doctor". The general condition has improved. As noted in the previous report, there are no fixed deformities except generalized kyphosis.

Comment on the Cases of Cerebral Diplegia.

There has been an improvement in the cases under observation. Coordination has improved somewhat and on the whole the children are calmer and less emotional, although they are still very easily upset, especially by the presence of strangers. The muscular hypertonicity is generally less marked and, at a number of the joints, the passive range of movement has increased.

General Comment.

The committee considers that the Commonwealth and State Governments are to be commended for having made possible the investigation of Sister Kenny's method of treatment in their endeavour to help the paralysed members of the community.

It has been apparent to the committee that Sister Kenny has been actuated by high motives and ideals in putting forward her method of treatment of paralysis. The committee also appreciates her desire to have her clinics under the control of the medical profession.

It considers that her personality has been a very great factor in the successful organization of her clinics.

The committee considers that the treatment of paralytic cripples belongs to the sphere of orthopædic specialists. Sister Kenny has carried out a method of treatment of one phase of paralytic conditions ordinarily performed by masseuses, that is reeducation, hydrotherapy and passive stretching.

Sister Kenny limits her clinic to the following four types of cases: (i) infantile paralysis, (ii) birth palsy, (iii) spastic paralysis, (iv) post-meningitic spastic conditions.

The orthodox masseuse is trained in massage, reeducation, splint work, hydrotherapy, plaster work, electrical testing and electrical methods of treatment, and does not confine herself like Sister Kenny's staff to reeducation, hydrotherapy and passive stretching.

Although several cases have made considerable improvement, the muscle power of these cases of chronic infantile paralysis has not improved at a greater rate nor to a greater extent than would be expected to be obtained by orthodox methods of treatment.

The committee, however, would like to point out that orthodox methods, as used in the large medical centres in other parts of the world, are not used throughout Australia to their fullest extent. This is largely the result of lack of finance entailing deficient accommodation, limitation of personnel and equipment at the main hospital centres.

Omitting from consideration the question of splints, we are of the opinion that no new general principle has been added to the treatment of infantile paralysis. In the sphere of reeducation, hydrotherapy and passive stretching, Sister Kenny is using methods which have been and are broadly approved by orthopædic surgeons.

With regard to the question of damage through the absence of splinting, final conclusions cannot be determined until a sufficient number of acute cases have been followed for a substantial time or chronic cases followed for a longer period of time. The major aspect of this question will depend on the acute cases, which have so far not come within the ambit of the examination by the committee.

With regard to cases of spastic paralysis, sufficient time has not elapsed for the committee to come to final conclusions. The great majority of these cases are not presented for specialized treatment, and Sister Kenny is to be congratulated for drawing attention to this problem. There are numerous methods in use in the technique of muscle education in spastic paralysis. Sister Kenny's methods are broadly acceptable to orthopædic surgeons.

Although there has been some improvement in all the cases observed by the committee, the improvement has not been marked. Since only a very small number of cases have been observed for a comparatively short time, the committee can only come to the tentative conclusion that the general progress of the cases has not been at a greater rate than would be expected by orthodox methods. The committee, however, would like to point out that orthodox methods of treating spastic paralysis, as used in the large medical centres in other parts of the world, are not used throughout Australia to their fullest extent. This is largely the result of lack of finance entailing deficient accommodation *et cetera*.

Recommendations.

Sister Kenny has fulfilled a useful service to the community in having aroused the Government authorities and public opinion in her effort to effect the organized treatment of the paralysed section of crippledom, and by having introduced to Australia the genesis of a scheme for the training of orthopædic nurses. With regard to the latter, the committee considers that it is insufficient to train a general nurse in the technique of muscle reeducation alone and that the minimum requirements should be three years' training and experience as a ward nurse in an orthopædic hospital. This should be followed by eighteen months' intensive training in massage, general physiotherapy and splinting, after which the trainees can be directed to the department which best suits their capabilities.

With regard to the conduct of the clinic, this committee considers that the present arrangement is not in the best interests of the patient, as there does not exist the close and continuous contact between patient and orthopædic surgeon which is essential for a full understanding of the progress of each case.

The committee does not consider it possible to form final and complete conclusions from the results of the treatment of the types of paralysis as carried out at the Elizabeth Kenny (New South Wales) Clinic by the examination of these twenty-five cases mostly of a chronic nature during such a short period of time as fifteen months.

Nevertheless, as a result of: (i) the examination of these twenty-five cases; (ii) the fact that Sister Kenny has been able to obtain the requirements for her methods of treatment, namely, financial assistance, accommodation, appliances, personnel and transport facilities; (iii) a study of the methods set out in the publication "Infantile Paralysis and Cerebral Diplegia: Methods Used for the Restoration of Function by Elizabeth Kenny", 1937, this committee considers that instead of attempting to enlarge further upon the benefits and shortcomings of the methods advocated by Sister Kenny, it can best express its opinion by outlining what is considered to be the ideal scheme for the prevention, treatment and rehabilitation of cripples, and by showing how Sister Kenny's trainees can be absorbed in such a scheme. Such schemes are existent in many districts in England, and we would refer to the Shropshire Orthopædic Hospital, England, as an outstanding example of such schemes.

Such a scheme envisages the creation of an open-air orthopædic hospital of not less than 300 beds (public, intermediate and private) in spacious grounds in a district to be carefully selected. The actual amount of accommodation would be determined by the collaboration of the figures of the number of cases obtainable from the New South Wales Society for Crippled Children, the Far West Health Scheme, and the orthopædic departments of general hospitals. In this connexion the census of crippled children compiled some years ago and in the possession of the societies dealing with this problem would be of value. In such a hospital paralytics of different types can be segregated and receive efficient treatment.

Within the hospital grounds there would be (*a*) a hostel for the housing of ambulant cases, (*b*) a school, (*c*) occupational therapy workshops, (*d*) occupational training workshops and school, (*e*) a splint factory.

This hospital would be staffed by: (i) Consulting orthopædic surgeons, to whom an honorarium should be paid because of the time-consuming nature of the work, and to ensure that experienced surgeons would apply for appointment. (ii) A medical superintendent especially trained in orthopædic work, splint work, and muscle reeducation; and a staff of resident medical officers. (iii) A matron with special qualifications for such a specialty hospital. (iv) Nurses and masseuses as required. In this department the personnel already trained by Sister Kenny can be absorbed, although in the future it would be preferable that the hospital train its own staff and thus produce a continuity of ideas and practice. (v) Teachers in the school and workshops, and splint-makers would also be necessary.

In such a hospital cases requiring prolonged and specialized treatment can be admitted at the outset of the complaint and remain within the hospital grounds until no further improvement is to be expected, or until they have been trained in work commensurate with their disability so that they become wage earners instead of pensioners.

The present methods in Australia interfere with schooling for the purpose of treatment and restrict treatment on account of education, whilst the fulfilment of a

scheme as set out would allow treatment and education to be carried out in a more efficient manner.

In order to obtain the optimum recovery in cases of paralysis (infantile, spastic and other) this committee is of the opinion that efficient splinting and repeated (twice or thrice daily) reeducation of muscles are essential, and that it is practically impossible to give such efficient treatment unless the patients are constantly under expert supervision preferably in the orthopædic hospital as outlined above.

As an extension of such a scheme clinics would be established in surrounding districts, and at regular intervals a person trained in this work and connected with the hospital should examine cases which have left the hospital and report any deformity or other orthopædic abnormality and advise in the matter of necessary repairs or adjustments to splints.

British Medical Association News.

SCHOLARSHIPS AND GRANTS IN AID OF SCIENTIFIC RESEARCH.

Scholarships.

THE Council of the British Medical Association is prepared to receive applications for research scholarships as follows: an Ernest Hart Memorial Scholarship, of the value of £200 *per annum*; a Walter Dixon Scholarship, of the value of £200 *per annum*; three research scholarships, each of the value of £150 *per annum*.

These scholarships are given to candidates whom the Science Committee of the Association recommends as qualified to undertake research in any subject (including State medicine) relating to the causation, prevention or treatment of disease.

Each scholarship is tenable for one year, commencing on October 1, 1938. A scholar may be reappointed for not more than two additional terms. A scholar is not necessarily required to devote the whole of his or her time to the work of research, but may hold a junior appointment at a university, medical school or hospital, provided the duties of such appointment do not interfere with his or her work as a scholar.

Grants.

The Council of the British Medical Association is also prepared to receive applications for grants for the assistance of research into the causation, treatment or prevention of disease. Preference will be given, other things being equal, to members of the medical profession and to applicants who propose as subjects of investigation problems directly related to practical medicine.

Conditions of Award: Applications.

A copy of the regulations relative to the award of the scholarships and grants for 1938 and of the prescribed application form can be obtained on application to the General Secretary of the Federal Council of the British Medical Association in Australia, British Medical Association House, 135, Macquarie Street, Sydney. The completed application form is required to be submitted to the Secretary of the Federal Council not later than March 1, 1938.

Applicants are required to furnish the names of three referees who are competent to speak as to their capacity for the research contemplated.

Obituary.

DAVID ORME MASSON.

WE are indebted to Dr. H. Boyd Graham for the following appreciation of the late Sir David Orme Masson.

Sir David Orme Masson, Emeritus Professor of Chemistry at the University of Melbourne, who died at his home in Melbourne on August 10, 1937, was born in London on January 13, 1858. He was the only son of the late David Masson, the distinguished professor of Rhetoric and English Literature in the University of Edinburgh from 1865 to 1895.

David Orme Masson was educated at Edinburgh Academy and graduated at the University of Edinburgh in arts and science. He obtained many academic honours in England, Scotland, and at Göttingen. Under Professor Sir William Ramsay at University College, Bristol, he served his apprenticeship as a teacher of chemistry. From 1882 to 1885 he held a research fellowship in his old university. In 1884 he founded the Students' Representative Council at that university and was its first senior president. In this work and the establishment of the University Union he was associated with Robert Fitzroy Bell and Robert Cochran Buist.

In 1886, after his marriage to the daughter of the late Sir John Struthers, Professor of Anatomy in the University of Aberdeen, he came to Melbourne as Professor of Chemistry and occupied the chair until his retirement in 1924.

At Edinburgh University he graduated Master of Arts in 1878, Bachelor of Science in 1880, and Doctor of Science in 1884, and received the honorary degree of Doctor of Laws when he visited his home university in 1924. He was also a Fellow of the Institute of Chemistry, and in 1903 he had the distinction of being made a Fellow of the Royal Society. In 1918 he became a Commander of the Most Excellent Order of the British Empire and was created Knight Commander in 1923.

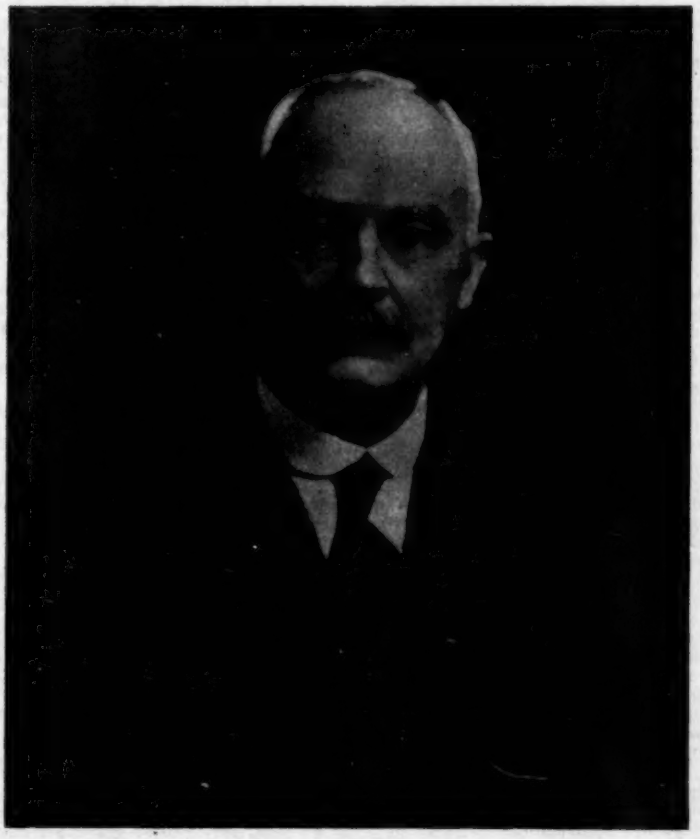
He was President of the Australasian Association for the Advancement of Science from 1911 to 1913; Deputy Chairman of the Commonwealth Advisory Council, Science and Industry, from 1916 to 1920, and, later, Chairman of the Victorian State Committee of the Council for Scientific and Industrial Research; President of the Australian National Research Council from 1922 to 1926; first President of the Australian Chemical Institute in 1924, and occupied the position until 1934. He was also a President of the Professorial Board at the university. At the University of Melbourne Professor Masson built up a school of chemistry of high standing as a result of the excellence of his teaching and the way in which, in spite of the increasing burden of his administrative and public duties, he not only did valuable research work himself, but fostered it in his school. As has been said of his distinguished father, it is none the less true of him that he "made his lectures literature". For many years he gave systematic lectures in chemistry for medical students and charmed his classes with the grace and elegance of his diction, and the lucid manner in which he described the subject matter made his lectures unforgettable.

In the earlier part of his career his research work into the chemical constitution of nitro-glycerine was carried out at Edinburgh University. In Melbourne he was specially interested in the periodic classification of the elements, and published contributions on his researches on the theory of solutions, ionization and chemical dynamics. His writings on scientific subjects were published in a number of journals in Australia and in England.

Though he retired from the chair of chemistry in 1923, Masson was still very active and continued to exert an important influence in scientific circles and to prosecute his research work, which included an inquiry into molecular conductivity in aqueous solutions. The Australian National Research Council established the "Masson Lectures" in his honour, and Professor Wilsmore, of the University of Western Australia, delivered the first lecture in January, 1935, at Melbourne.

David Masson is survived by Lady Masson, his son, Professor James Irvine Orme Masson, who occupies the chair of chemistry in Durham University, and by one daughter, Mrs. Walter E. Bassett, of Melbourne. Another daughter, who was married to Professor Bronislaw Malinowski, of the chair of anthropology in the University of London, died in 1935. Miss Flora Masson and Miss Rosaline Masson, his sisters, live in Edinburgh and are well known as writers; and another sister is the wife of Professor G. Lovell Gulland, Emeritus Professor of Medicine in the University of Edinburgh.

Masson exerted a great influence in the lives of many doctors now practising in Australia when they took the course in chemistry at an impressionable age and met the calm, exact and kindly man of science whose very presence roused in them the greatest possible respect for his scientific outlook and indeed for science itself. They are proud of him and of his achievements, which, with those of his illustrious colleagues, Sir Harry Allen, Sir Baldwin Spencer and Sir Thomas Lyle, raised the school of medicine of the University of Melbourne to the highest pinnacle of fame.



Sir David Rivett writes:

I do not know how professional educationists are wont to assess the merits of university teachers, but there is one criterion which to me seems to be all sufficient for judgement. Does a student meeting a difficulty in later life, either in his own science or in still wider affairs, ever ask himself how his former teacher would have faced a like problem, and so gain inspiration and guidance? If he does both of these, then that teacher was a master.

In the notice that precedes this, mention is made of the respect which Sir David Masson inspired for science itself. He did more than that: he afforded a living example of that spirit of complete intellectual honesty which, added to sound logic and experimental skill, is the foundation of all science. The hundreds of medical and other undergraduates who passed through his classes may have forgotten most of the chemistry which he so charmingly expounded and demonstrated; but none of them failed to learn from him, and more or less to retain, a thorough appreciation of the scientific attitude of mind and its application to any subject under examination. He sought truth and discovered it, and in his own incomparable manner led others to understand and, one may hope, to practise his own method of attack upon any problem.

To be utterly honest is not always easy. I remember very distinctly a trifling incident (one of those little things that stick fast in the memory) at the end of an elementary lecture thirty odd years ago. Nitrogen was being prepared by boiling a solution containing sodium nitrite and ammonium sulphate, and, as a test, a burning taper was thrust into the neck of the tube. It instantly went out, as was right and proper in nitrogen: apparently a perfect demonstration. I can still remember the thought flashing through my mind, that the steam alone might have been responsible, and my feeling of intense satisfaction when the professor hastily added, as people began to close their notebooks: "As a matter of fact, I have not really proved to you that the gas is nitrogen, since the steam might have extinguished the taper. I shall therefore return to this again in my next lecture." The demonstration of honesty was worth much more than that of the presence of nitrogen.

There was never any sign of restlessness or lack of attention in Professor Masson's classes. Not seldom one heard complaints after a lecture that it had been so interesting that the complainant had forgotten all about taking notes. Very rarely was there the slightest breach of lecture-room courtesy on the part of a student; it was too well known that no other teacher in the university was so capable of swiftly making even the most hardened culprit blush deeply and feel utterly foolish. And what group of undergraduates could fail to appreciate a lecturer who, entering the theatre to find strong evidence that not long before there had been considerable activity in throwing berries about, stopped suddenly and, without a moment's hesitation, exclaimed: "Gentlemen, I protest against being berried before my time!"

For thirty-seven years Sir David Masson was not only a great teacher and the builder of a university school of high scientific ideals and attainment, but he was an investigator of international reputation and an inspirer of many a first-class young graduate. Had he remained in Great Britain instead of coming to us from Edinburgh in 1886, he would most certainly have been offered in later years the highest honours and offices open to a great scientist; but I doubt whether he ever for a moment regretted his devotion to the outer Empire. In 1912 he declined the succession to Sir William Ramsay (a colleague of earlier days at Bristol) in the chair of chemistry at University College, London.

In his research work he always preferred problems that presented theoretical and mathematical difficulties. Mere measurement which today so often passes for "research", did not interest him for its own sake. He liked his laboratory technique to be as simple as possible, being in that way rather a contrast with his distinguished pupil and colleague B. D. Steele, who was essentially a designer of

apparatus and a skilful builder. They made a good combination.

Few men can have possessed such powers of concentration as he. I have known him accidentally to receive a very nasty burn during a lecture, but to remain unconscious of it until he had finished talking, when it made itself sharply apparent. In the laboratory, too, he would become engrossed in a piece of work and carry it on with rare persistence. One Friday afternoon a lecturer bade him good-bye, and, finding him already in the laboratory when he arrived again on Monday morning, humorously remarked: "One would almost think you had been here since Friday." "As a matter of fact I have!" was the reply. Over sixty hours of continuous work! Sir Charles Martin was one of his earlier colleagues and co-workers, and he used to say that no one really knew Masson who had not started work (and talk) with him about midnight. These two must have had some great times in the laboratory in the old days. Even into his eightieth year Sir David kept to his habit of prolonged hard work into the late hours of the next morning, and some of his best work on electrolytic solutions came from these studies.

It is not necessary here to give any technical account of his researches. They cover a wide field, and for clear thinking and clear expression his papers are just delightful models. He was a worthy son of the great Historiographer-Royal of Scotland, Professor David Masson, of Edinburgh. The Fellowship of the Royal Society was conferred on him in 1903 at the age of forty-five. I remember the morning it was announced in the Press, and the charming way in which he acknowledged a particularly enthusiastic reception from the first-year class and a congratulatory message scribbled on the blackboard.

As to his activities as a notable citizen, they are too numerous to cite here in detail. He was the founder of the University Chemical Society, the Society of Chemical Industry of Victoria, and the Australian Chemical Institute. He was associated with the Australasian Association for the Advancement of Science in its earliest years, and was President in 1911-1913. In that capacity he was the foremost supporter of Mawson's first expedition to Antarctica and was later in charge of the committee which organized the second visit in 1929. At different times he served on various government commissions, and during the War undertook many duties connected with the supply of munitions. In 1916, at the invitation of Mr. W. M. Hughes, he became Chairman of the Advisory Council of Science and Industry, and he remained intimately associated with all the successive developments of that body. He was the senior member of the present Council for Scientific and Industrial Research from its foundation in 1926, and his work in the application of science to problems of Australian industry would in itself provide material for a lengthy article. He was a founder, and for five years the President, of the Australian National Research Council; and all these and many other activities were outside the immediate university circle where, as Dean of the Faculty of Science for many years, as President of the Professorial Board, and in numerous other capacities, he was always the honoured leader and respected counsellor.

As a companion for a walk or for a fireside chat Sir David was surely without equal. His rapidity of thought, quickness in sizing up a situation, his lucid expression of his judgement, and the ripple of wit that was never absent, made it ever a delight and an education to be with him. It is a singular misfortune that he never could be induced to write a book, whether it had been on the early days in his father's home when Huxley and Carlyle were frequent visitors, or on the periodic classification of the elements, would not have mattered much. He was a master of diction, and one could wish he had left more of his beautiful literary practice on permanent record. An autobiography would have been most welcome; but there was always a modesty, a reticence about him which, I am sure, made an undertaking of the kind for him an utter impossibility.

Behind Sir David's public life was the happiest of home lives. What Lady Masson and he in their years at "Chanonry" meant to the University of Melbourne many generations of graduates know well; and whether in university life or in the wider circle of our Australian community, the inspiration of this great teacher and investigator and of this wise and devoted citizen will never be lost.

Sir James Barrett writes:

May I very briefly but with deep feeling add my tribute to the memory of a great figure who has been lost to the University of Melbourne.

From the date of his arrival in Melbourne to the end he remained a warm and valued friend to me and, as in the case of all others with whom he came in contact, he kept alive in me a feeling of respect, not only for his capacity, but for his ideals and high character.

Differing as I did at times from him acutely in matters of university policy, he nevertheless clearly distinguished, as such men do, between intellectual differences and any degeneration into personal feeling, which I need hardly say never developed.

Blessed as he was with a gifted pen and an unfailing sense of humour, he was as formidable in controversy as anyone I have known. The sense of humour is a great asset. He arrived in Melbourne when the land boom was in progress, and an agent soon discovered him and was given a courteous interview. The agent explained a land scheme and pointed out that Professor Masson would be in on the "ground floor". On being asked what that meant, the agent stated that Professor Masson would be a "first robber", and received the final information that he, Professor Masson, had no desire in any circumstances to become a robber.

A man who created the school of chemistry, who enjoyed the respect of the chemical profession, of his colleagues and of all who knew him, has passed out of the sight of men, leaving a memory of ability and personality which serves, and will serve, as a practical ideal for those who follow. *Requiescat.*

ROBERT TREVOR FETHERSTONHAUGH.

We regret to announce the death of Dr. Robert Trevor Fetherstonhaugh, which occurred on November 1, 1937, at Brighton, Victoria.

ALFRED WALTER CAMPBELL.

We regret to announce the death of Dr. Alfred Walter Campbell, which occurred on November 4, 1937, at Rose Bay, New South Wales.

LESLIE FETHERSTON.

We regret to announce the death of Dr. Leslie Fetherston, which occurred on November 8, 1937, at Sydney, New South Wales.

Correspondence.

THE RESULTS OF RADICAL ANTRUM OPERATIONS IN CHILDREN.

SIR: I am grateful to Professor Amies for pointing out that "if the lining membrane of the antrum were stripped, there would be a definite possibility of interfering with the tooth germs of one or more of the permanent teeth".

My criticism of the possibility of dental damage was confined to the removal of bone in the canine fossa and apparently the risk during the removal of the antral mucosa had not been considered. At the same time, this appears to be a "possibility" or "grave risk" only and does not seem to occur in actual practice. There is also a possibility of damaging the recurrent laryngeal nerves in the operation of thyreoidectomy, or of the facial nerve in mastoidectomy, or of an incisional hernia forming after

cholecystectomy or appendicectomy, yet no one ever hesitates to do the operation appropriate to the occasion on account of such risks.

When these radical operations were done, they were performed with the expectation that the teeth would be damaged, as this was the current teaching, but it seemed to be the lesser of two evils. At the time I was very dissatisfied with the endonasal operation. Its performance was difficult, as the approach was confined and the visibility poor. In consequence the opening was often inadequate and soon closed again and the patients were unrelieved.

When the canine fossa route was used, the whole of the naso-antral wall came under direct inspection and the making of an adequate opening became very much easier. Moreover, another advantage was being able to inspect the antral mucosa, which could either be left undisturbed or removed, according as to whether it was thought it would recover or not. The results seemed to be superior to those obtained by the endonasal route.

Now, after a lapse of time, during which permanent dentition has been completed, it has been found that no damage to the teeth has occurred in the majority of cases. I think it is time this bogy was laid by the heels, as it is doing harm to rhinology. Apparently there are many rhinologists of repute who perform only the endonasal operation, irrespective of the length of history of the case. In my paper the last case quoted was one which had had a perfect endonasal operation performed at another hospital but was unrelieved, because the antral mucosa was grossly degenerate and in a quite unrecoverable condition.

Rhinology is thus being brought into disrepute. Cases drift on unrelieved after the endonasal operation, until, from an eminently curable condition, with the infection confined to the antra, they end up with a spread to the ethmoidal labyrinth or with the development of a bronchiectasis, both of which are incurable.

And all this for the sake of a few teeth, damage to which at the best will not occur or at the worst will result in a relatively innocuous lesion.

Yours, etc.,

12, Collins Street, Melbourne,
October 26, 1937.

G. A. D. McARTHUR.

IMPRESSIONS OF A SHIP'S SURGEON, 1848.

SIR: Dr. Kevin Byrne has been kind enough to comment most interestingly upon the reference to an island of Trinidad in a recent article of mine (THE MEDICAL JOURNAL OF AUSTRALIA, October 9, 1937), and I am grateful to him for enlightening me on this point, as I had erroneously associated this name with the British possession in the West Indies. On my wall map of the world the position indicated by Dr. Kevin Byrne is shown as a tiny black dot which for many months I have been mistaking for something else.

At the back of his diary, Dr. Hort Brown made an entry of the ship's position from day to day. On July 19, when they were in the neighbourhood of this island, the entry shows latitude 22° 30′, longitude 27° 50′, which is near enough to substantiate Dr. Byrne's contention.

The Misses Hort Brown, of Darling Point, Sydney, have consented to their father's diary being handed to the Mitchell Library at the end of this year.

Yours, etc.,

"Brislington", Parramatta,
October 30, 1937.

K. S. MACARTHUR BROWN.

SCHIZOPHRENIA AND ITS TREATMENT BY INSULIN AND "CARDIAZOL".

SIR: I have read Dr. Ellery's article in the issue of your journal of October 2 with some interest. He draws particular attention to the empirical use of insulin in mental disorders, which has appeared in various journals recently, but apparently he has overlooked some very important work which has been going on in regard to the association of septic conditions and mental disease. This is of such outstanding importance that it must have escaped the notice of few. In a letter in the issue of this journal of August 26, 1933, Dr. Ellery, with caustic satire, ridicules the action of the streptococcus in the production of disease and, having taken such a stand, is not inclined to back down from the attitude he adopted. In view of recent work such an attitude is not to the best interest of our profession. Surely the medical teaching Dr. Ellery has had has taught him that bacteria do gain entrance to the blood stream and cause damage to certain tissues and organs, and as the brain, like most other tissues, is supplied with blood, it must at times of a necessity be also supplied with organisms, whose action will interfere with the normal function of the particular area involved.

Whilst mentioning most other forms of treatment that have been employed in the treatment of these cases, he does not consider that infection could possibly be a causal agent of the condition, and so does not even suggest that attention be turned in that direction. If Dr. Ellery would look up the issue of March 6, 1937, of the *British Medical Journal*, he will find an article written by Dr. T. C. Graves, Chief Medical Officer of the Birmingham Mental Hospital, where he records observations on the treatment of 2,056 cases of mental disorder, mainly certified by three ear, nose and throat surgeons, working separately during the last nine years. If after reading that article he is still not impressed by the action of infection in mental disorders, then I am afraid nothing will convince him. Yet there are still other publications on this subject, of which I shall mention the dates and journals of a few: *The Lancet*, July 9, 1932; *The British Dental Journal*, August 1, 1924; *Journal of Medical Science*, January, 1931; *Proceedings of the Royal Society of Medicine*, 1929, Section of Laryngology, page 45; *ibidem*, September, 1934. With all this work published by reliable men who have spent a great part of their lives testing these methods of treatment, it is difficult to understand the mental attitude of one who will give it no consideration. Honest criticism is always healthy and good for our profession, and pioneers of new ideas, although having to put up with a good deal of abuse, are always ready to welcome criticism and controversy, providing it is carried out with the dignity our profession merits. It is the fact that other and younger men, reading Dr. Ellery's article, may be led to believe that there is no other or better treatment for mental disorders than what he has suggested, that has led me to write these few lines. I have nothing to say against the insulin treatment, but it cannot come within cooee of eradicating the factor which, in many cases, is the cause of not only this, but of so many ills to which the body is heir and to which I have been drawing attention for so many years.

Yours, etc.,

7, Raglan Street North, Ballarat, Victoria.
Undated.

SYDNEY PERN.

Corrigenda.

WE have been informed that several errors have occurred in the issue of the journal of October 23, at page 744, in the second column. Speaking at the meeting of the Section of Oto-Rhino-Laryngology at the Adelaide Congress, on the subject of posterior nasal sinusitis, Dr. H. M. Jay is reported to have said, at line 35: "This patient did not have retrobulbar neuritis"; this should read: "This patient must have had a retrobulbar neuritis". At line 42, the words "a facial palsy on one side" should be "a bilateral abducens palsy". At line 46, the words "the facial nerve recovered" should be "the ocular paralyses recovered".

WE are informed that an error has occurred in the issue of October 23, 1937, at page 712, line 24. At the meeting of the Section of Obstetrics and Gynæcology at the Adelaide

congress, contributing to the discussion on the indications for interference during labour, Dr. B. E. Wurm is reported to have stated: "In the treatment of occipito-posterior positions the teaching at the Rotunda Hospital was to apply forceps and to rotate the head with these rather than by manual rotation." This should read: "The Rotunda teaching was delivery with forceps without turning; in other words, delivery free to the pubes. Dr. Wurm said that he considered it better, in difficult cases, to deliver the fœtus in the posterior position rather than to struggle to rotate it manually, damage to the perineum being preferable to possible internal damage."

Books Received.

SKIN DISEASES IN CHILDREN, by G. M. MacKee, M.D., and A. C. Cipollaro, M.D.; 1936. New York: Paul B. Hoeber Incorporated; Australia: Angus and Robertson Limited. Medium 8vo, pp. 363, with 153 illustrations. Price: 33s. net.

ILLUSTRATIONS OF REGIONAL ANATOMY, by E. B. Jamieson, M.D.; Section I: Central Nervous System (containing 48 plates); Section II: Head and Neck (containing 63 plates); Section III: Abdomen (containing 37 plates); Section IV: Pelvis (containing 33 plates); Section V: Thorax (containing 30 plates); 1937. Edinburgh: E. and S. Livingstone. Double foolscap 8vo.

HANDBOOK OF MICROSCOPICAL TECHNIQUE, FOR WORKERS IN ANIMAL AND PLANT TISSUES, edited by C. E. McClung, Ph.D.; Second Edition, revised and enlarged; 1937. New York: Paul B. Hoeber Incorporated; Australia: Angus and Robertson Limited. Medium 8vo, pp. 715, with 82 illustrations. Price: 48s. net.

Diary for the Month.

Nov. 16.—New South Wales Branch, B.M.A.: Ethics Committee.
Nov. 16.—Tasmanian Branch, B.M.A.: Council.
Nov. 17.—Western Australian Branch, B.M.A.: Branch.
Nov. 18.—New South Wales Branch, B.M.A.: Clinical Meeting.
Nov. 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
Nov. 24.—Victorian Branch, B.M.A.: Council.
Nov. 25.—New South Wales Branch, B.M.A.: Branch.
Nov. 25.—South Australian Branch, B.M.A.: Branch.
Nov. 26.—Queensland Branch, B.M.A.: Council.
Dec. 1.—Western Australian Branch, B.M.A.: Council.
Dec. 2.—South Australian Branch, B.M.A.: Council.
Dec. 7.—Tasmanian Branch, B.M.A.: Council.
Dec. 7.—New South Wales Branch, B.M.A.: Organization and Science Committee.
Dec. 7.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
Dec. 9.—New South Wales Branch, B.M.A.: Branch.
Dec. 10.—Queensland Branch, B.M.A.: Annual Meeting.
Dec. 14.—Tasmanian Branch, B.M.A.: Branch.
Dec. 14.—New South Wales Branch, B.M.A.: Ethics Committee.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," pages xx to xxii.

BALLARAT AND DISTRICT BASE HOSPITAL, BALLARAT, VICTORIA: Resident Medical Officers.

CHILDREN'S HOSPITAL (INCORPORATED), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

FREMANTLE HOSPITAL, FREMANTLE, WESTERN AUSTRALIA: Resident Medical Officers.

HOBART GENERAL HOSPITAL, HOBART, TASMANIA: Resident Medical Officers.

INNISFAIL HOSPITALS BOARD, INNISFAIL, QUEENSLAND: Assistant Medical Officer.

MOUNT MORGAN HOSPITAL, MOUNT MORGAN, QUEENSLAND: Resident Medical Officer.

THE TOWNSVILLE HOSPITALS BOARD, TOWNSVILLE, QUEENSLAND: Resident Medical Officers.

THE UNIVERSITY OF MELBOURNE, VICTORIA: Senior Lectureship in Anatomy.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135 Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178 North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

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